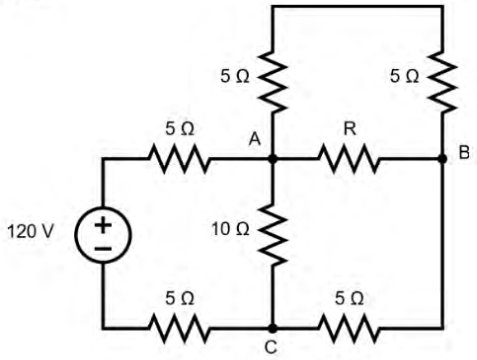
CBET Practice Test

1. In which of the following muscle types are the filaments arranged in a disorderly manner?

a. Cardiac
b. Smooth
c. Skeletal
d. Rough

2. What is the value of the unknown resistance in the following circuit, given it has a 120-volt source and 8 amps of current?



a. $R = 10\ \Omega$
b. $R = 5\ \Omega$
c. $R = 20\ \Omega$
d. $R = 25\ \Omega$

3. A new enteral feeding pump is put into service but quickly sent to biomed for repair. The report says it was working fine but began giving a constant low flow error. Which of the following symptoms would NOT cause this alert?

a. Excessive ambient light by the feeding set detector
b. Feeding solution coating drip chamber walls
c. Kinked or clamped tubing upstream of the pump
d. A dislodged drip chamber

4. Which of the following statements describes the function of PING?

a. PING tests the current and resistance of a physical connection.
b. PING mode echoes back all information received from another device.
c. PING is the function of ultrasound transducers to send and receive signals.
d. PING sends data to check the time to send and receive a message.

5. How does applied positive end-expiratory pressure (PEEP) affect ventilator-assisted respiration?

a. It helps treat hyperoxemia.
b. It improves systemic circulation.
c. It reduces the risk of barotrauma.
d. It helps prevent alveolar collapse.

6. A sphygmomanometer is brought in for service with a note that the pressure readings are always too high. What is the MOST appropriate course of action to check the device?

a. Perform a test run of the device on a noninvasive blood pressure simulator.
b. Visually inspect the sphygmomanometer's inflatable cuff and patch it.
c. Recalibrate the device's manometer and return to service.
d. Request a test of the device on another patient to examine it in use.

7. Which of the following statements describes normal function of a sequential compression device?

a. Multiple cuffs are inflated and deflated simultaneously in a pattern, followed by a rest period before repeating.
b. Multiple cuffs are inflated in series from the distal to proximal end and deflated for a rest period before repeating.
c. Multiple cuffs are inflated in series from the proximal to distal end and deflated for a rest period before repeating.
d. Multiple separate cuffs are inflated and then deflated one after the other in sequence, and the cycle is repeated.

8. Which of the following situations is likely a device error rather than use error?

a. A medication overdose due to a misconfigured infusion pump
b. A nurse station not receiving patient information from vital signs monitors
c. Blurry ultrasound imagery from a newly inspected handheld ultrasound machine
d. Noisy ECG readings near high-powered electrical equipment

9. Which of the following statements is FALSE?

a. Non-care electrical equipment in the patient vicinity must be inspected prior to use.
b. Nonfunctional and worn-out electrical equipment must be removed.
c. All patient care equipment must have its leakage current tested before use.
d. Household electronics are not permitted except for those with grounding conductors.

10. A pressurized flow blood warmer is brought in with reports of a loud noise during use. Which is NOT a likely cause for this complaint?

a. A faulty compressor
b. Loose assembly
c. A faulty peristaltic pump
d. Loose part in compressor

11. Which of the following thermoregulation methods is used with hypo/hyperthermia machines?

a. Radiant heating and cooling
b. Heating and cooling blankets
c. Extracorporeal blood warming
d. Ultraviolet heating

12. Which of the following is unique to invasive, rather than non-invasive, blood pressure measurement?

a. It can provide continuous blood pressure measurements.
b. Performance of the method can affect the results.
c. A comparison between systolic and diastolic blood pressure can be made.
d. Hypotensive blood pressures can be monitored.

13. Which of the following MOST closely represents the relative centrifugal force (RCF) of hematocrit centrifuges?

a. 30,000 RCF
b. 3,000 RCF
c. 100,000 RCF
d. 10,000 RCF

14. Which of the following components is located after filtration in a hemodialysis circuit?

a. Dialyzer pressure monitor
b. Blood pump
c. Heparin pump
d. Air trap

15. Which of the following statements is accurate about digital voltmeters?

a. The digital voltmeter requires no external power to measure voltage across two points.
b. The range of voltages is always determined by the voltmeter automatically.
c. An amount of current is always drawn away from the circuit being measured.
d. The resistance of the circuit can also be measured in addition to current.

16. Which of the following is a device used in manual blood pressure auscultation?

a. Manometer
b. Pressure transducer
c. Cannula
d. Korotkoff sounds

17. Which of the following is NOT a common concern when using heart-lung machines?

a. Heparin thickens the blood prior to recirculation.
b. Heat exchange in the machine cools the blood.
c. Aggressive blood pumps may damage blood cells.
d. Blood pump failure may occur, ceasing circulation.

18. What is being examined by use of an ophthalmoscope?

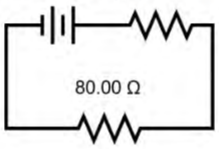
a. Tympanic membrane
b. Fundus
c. Palatine tonsils
d. Sinuses

19. Which of the following is NOT a standard IEC or NFPA 99 current leakage test?

a. Earth leakage current
b. Patient leakage current
c. Chassis leakage current
d. Machine leakage current

20. A real battery possesses an internal resistance. What is the internal resistance, in ohms, of a battery having 1.58 volts that drops to 1.46 volts when an 80.00-ohm resistor is placed across the battery's terminals? Consider the following circuit:

The battery may be treated like an ideal battery with an additional resistor:



a. 8.25
b. 6.58
c. 0.12
d. 1.46

21. A sequential compression device is brought in reported as having low sleeve pressure. What is the first item to check?

a. Check the circuitry to the alert light.
b. Check the chambers and tubing for leaks.
c. Check the pressure gauge for the sleeve.
d. Check the function of the pump.

22. What is measured with the continuity mode of a digital multimeter (DMM)?

a. Peak voltage across a component
d. Total current between two points
c. Voltage drop across two points
b. Total resistance between two points

23. The Centers for Medicare and Medicaid Services (CMS) are primarily responsible for which of the following areas of health care?

a. Accrediting research laboratories
b. Accreditation and certification of healthcare facilities
c. Publication of standards for quality improvement in organizations
d. Overseeing health-care insurance for small business and individuals

24. Biomed is requested to examine a hypo/hyperthermia machine. The device is said to not be providing the desired level of cooling or heating in either mode. A preliminary check reveals the device is receiving the appropriate power supply and no leaks in the blanket used or water pooling by the device. What else might be responsible for this issue?

a. Broken heating element
b. Insufficient flow rate
c. Faulty chiller connection
d. Cracked interior flow circuit

25. Which of the following is NOT a type of parameter simulated by a physiological simulator?

a. Current
b. Blood pressure
c. SpO_2
d. Temperature

26. Which of the following standard ECG leads provides a view of the inferior wall of the heart?

a. V1
b. aVF
c. aVR
d. I

27. Which force motivates filtration in the kidneys?

a. Osmosis
b. Smooth muscle contraction
c. Peristalsis
d. Blood pressure

28. When an infusion pump is set to administer a drug at a high rate of infusion during scheduled, short periods that are separated by longer interval, low-rate infusion, what is this called?

a. Continuous infusion
b. Oscillating infusion
c. Intermittent infusion
d. Standard infusion

29. Which of the following choices is NOT an advantage of syringe pumps?

a. Uses standardized containers
b. Fine control of infusion
c. Ideal for long-term infusion
d. High infusion volumes

30. Which of the following is NOT mandatory in accordance with the Globally Harmonized System (GHS)?

a. Labelling of carcinogenicity in animal testing
b. Hazard classification of pyrophoric substances
c. Precedence of safety data sheet (SDS) hazard terminology
d. Safe handling and storage procedures

31. The respiratory system _____ oxygen and _____ carbon dioxide.

a. inhales; exhales
b. delivers; expels
c. creates; absorbs
d. exhales; inhales

Answer Key and Explanations

1. B: Smooth muscle tissue is said to be arranged in a disorderly fashion because it is not striated like the other two types of muscle: cardiac and skeletal. occur as a result of the arrangement of sarcomeres, the repeating functional units of striated muscle. Smooth muscle is typically found in the supporting tissues of hollow organs and blood vessels. Cardiac muscle is found exclusively in the heart; it is responsible for the contractions that pump blood throughout the body. Skeletal muscle, by far the most preponderant in the body, controls the movements of the skeleton. The contractions of skeletal muscle are responsible for all voluntary motion. There is no such thing as rough muscle.

2. A: For this circuit, the voltage and current are already known. The unknown resistance is in the middle of several other resistors of known value, but the circuit can be simplified considerably. Remember that the total resistance of the circuit must satisfy Ohm's Law:

$$V = IR$$

$$120\ \text{V} = 8\ \text{A} \times R_{total}$$

$$R_{total} = \frac{120\ \text{V}}{8\ \text{A}} = 15\ \Omega$$

Ten ohms of this resistance can be attributed to the two 5-ohm resistors that are directly in series with the battery. The remaining 5 ohms is the equivalent resistance between nodes A and C:

$$R_{AC} = 5\ \Omega$$

To solve for *R*, first define a few more combined resistances and set up equations for them. First, define R_{ABC} as the resistance of the path from A to C that passes through B. R_{ABC} can be found by this equation:

$$\frac{1}{R_{AC}} = \frac{1}{10} + \frac{1}{R_{ABC}}$$

R_{AC} = 5 ohms, so the equation can be rewritten as follows:

$$\frac{1}{5}\ (= \frac{2}{10}) = \frac{1}{10} + \frac{1}{R_{ABC}}$$

$$\frac{1}{10} = \frac{1}{R_{ABC}}$$

$$R_{ABC} = 10\ \Omega$$

Now that R_{ABC} is known, split it into two segments that are in series: R_{AB} and R_{BC}.

$$R_{ABC} = R_{AB} + R_{BC}$$

R_{BC} is shown on the diagram to be 5 ohms, which means R_{AB} is also 5 ohms. Set up one final equation to solve for R:

$$1/R_{AB} = \frac{1}{R} + \frac{1}{5+5}$$

$$\frac{1}{5}\left(=\frac{2}{10}\right) = \frac{1}{10} + \frac{1}{R}$$

$$\frac{1}{10} = \frac{1}{R}$$

$$R = 10\ \Omega$$

3. A: Excessive light can cause the detector to report no feeding set is present, but this issue would not signal a low flow alarm. A coated drip chamber would obstruct the sensor, whereas kinked or clamped tubing would reduce actual flow, causing a low flow error. If the chamber was inserted incorrectly or dislodged afterward, the pump's sensor may not detect flow and also give the error.

4. D: The PING utility is used to send a message and have it sent back to check for a working connection. Multiple statistics on the number of echoed messages received and time taken are collected. PING is a networking tool, not a physical tool, which echoes back specific information, not all messages received. The PING utility is not related to ultrasound.

5. D: Applied (extrinsic) PEEP is used to maintain a minimum pressure at the end of exhalation, which can help prevent alveolar collapse and treat low blood oxygen. However, applied PEEP has been associated with incidence of hyperoxemia, decreased systemic circulation, and an increased risk for barotrauma (injury from excess pressure).

6. A: Testing the device on a physiological simulator can provide the best diagnostics because a patient may not always be available (D), and the specific cause is not immediately known (C and D). Any leak requiring repair or replacement (B) would result in lower pressure readings, not higher.

7. B: A sequential compression device is used to help move blood away from an immobile limb back to the heart. To do this, a series of cuffs are inflated one at a time, from the distal end to the proximal end, to push blood in the veins away from the limb, staying inflated for a short period before deflating for a longer rest period and then repeating the process. This imitates the effect of the muscle contraction compressing blood vessels in the limbs, causing the blood to move back toward the heart. If the cuffs were inflated in the reverse order, they would push blood toward the end of the limb instead.

8. B: Failure to receive data across the network is likely a failure on the network or of a physical component. Misconfiguration of an infusion pump is a direct use error. Blurry imagery with a known-good device is similarly likely to be due to improper technique or application. ECG noise can be caused by electromagnetic fields near the machines, and they should be performed away from high-powered equipment.

9. D: NFPA 99 permits household electronics without grounding conductors, provided they are not in the patient care vicinity, or else they must be double insulated. Inspection of equipment to be used in patient vicinity, removal of dysfunctional equipment, and testing of leakage current are all NFPA 99 requirements.

10. C: A pressurized flow warmer uses a compressor and pressure chamber to apply external pressure to blood bags, creating a faster flow. A common sign of a faulty compressor, or a worn or loose part inside it, is that it generates a loud noise. Similarly, if parts of the assembly or screws are too loose, it could vibrate enough to create a rattle or a hum. A peristaltic pump may be used in non-pressurized flow warmers, but not in this case, nor would it explain loud noise.

11. B: Hypo/hyperthermia machines run heated or cooled water through special blankets containing watertight tubing to regulate the patient's temperature.

12. D: Intra-arterial (invasive) blood pressure (IBP) has the benefit of providing continuous feedback on patient blood pressure even at low blood pressures. Continuous noninvasive blood pressure (CNAP) is a noninvasive method of continuous blood pressure measurement that provides constant feedback similar to IBP. Depending on the user's technique and positioning of the patient, noninvasive blood pressures can vary significantly. Both methods measure both systolic and diastolic blood pressure.

13. D: Hematocrit centrifuges can operate at speeds similar to that of microcentrifuges. Hematocrit centrifugation separates blood components at an RCF of 5000 or higher, which corresponds to forces generated by hematocrit centrifuges.

14. D: The air trap is one of the last components in the hemodialysis circuit, used to detect air bubbles and stop them from entering the patient's circulation. The dialyzer pressure monitor gives a measurement of the blood pressure entering the dialyzer. The blood pump is one of the first components in the circuit outside the body and pushes blood through the circuit. The heparin pump infuses the blood prior to filtration in the dialyzer with an anticoagulant, heparin.

15. C: Real digital voltmeters (DVMs) are not perfect, and thus they affect the circuit they are measuring by drawing a small amount of current away. The idea of an ideal voltmeter considers what the voltage differentials would be if the meter had infinite impedance and thus did not affect the circuit. DVMs require batteries, as opposed to analog voltmeters, which do not, but may instead require occasional calibration. Some DVMs may automatically set the scale based on measured voltage, but not all will and instead have manual controls to set the range. Current and resistance are measured by digital multimeters (DMMs), not voltmeters, which measure only voltage differentials.

16. A: Blood pressure auscultation is the function of a manual sphygmomanometer, which consists of an inflatable cuff to restrict blood flow, a manometer to measure pressure within the cuff, and a means to identify the return of blood flow, which is done using a stethoscope to listen for Korotkoff sounds (D) that indicate blood flow. A blood pressure transducer (B) and cannula (C) are components of invasive blood pressure measurement techniques that directly measure blood pressure rather than using auscultation.

17. A: Heparin is used to thin the circulating blood to prevent clotting. Blood temperature is intentionally lowered to reduce the patient's temperature and metabolic rates. Specific peristaltic or centrifugal pumps are used to gently move blood back to the patient and minimize blood damage. Pump failure would endanger the patient, so the machines feature backup pumps to prevent disaster.

18. B: An ophthalmoscope is used to examine the interior of the eye, called the fundus. The tympanic membrane is found in the ear, whereas the palatine tonsils are located at the back of the throat, and the sinuses are cavities found by the nose and above the eyes.

19. D: Earth leakage current and patient leakage current are IEC standard leakage tests, whereas chassis leakage current is an NFPA 99 test. Machine leakage is not a standard test by IEC or NFPA 99.

20. B: The current when the external resistance is connected can be found using the reduced voltage and the resistance of the connected load according to Ohm's Law:

$$I = \frac{V}{R}$$

$$I = \frac{1.46\ \text{V}}{80.00\ \Omega} = 0.01825\ \text{A}$$

Using the current of the circuit, the internal resistance of the battery is equal to the voltage drop of the battery over the current:

$$R_{internal} = \frac{(1.58\ \text{V} - 1.46\ \text{V})}{0.01825\ \text{A}} = 6.58\ \Omega$$

21. B: Leaks in inflatable chambers are a frequent issue with inflatable sleeves, including sequential compression devices (SCDs). If the device turned out to have no leaks in the tubing or the sleeve, it might be necessary to check whether the pump is generating enough pressure as well as checking the low-pressure sensor and the pressure gauge.

22. D: The continuity mode of a DMM emits a small amount of current between points in an unpowered circuit and measures the resistance between the two points. If the DMM measures a low resistance, it emits a tone indicating a connection.

23. D: The CMS is a federal agency that operates the Medicare and Medicaid programs and assists in maintaining access and affordability of health insurance coverage. Accreditation of research laboratories and health-care facilities is not overseen by CMS, and the International Organization for Standardization (ISO), not CMS, publishes standards for quality improvement.

24. B: A faulty heater or chiller, individually, only accounts for half of the issue reported—neither heating nor cooling modes provide the desired thermoregulation. Because there's no water pooling by the device, a crack or leak in the interior tubing is unlikely. An insufficient flow rate, due to any number of root causes, would reduce how quickly the heated or cooled water arrives at the blanket and return closer to room temperature than desired.

25. A: Blood pressure, blood oxygen saturation (SpO_2), and temperature are all types of physiological signals that a physiological simulator may reproduce. Current is measured by means of a multimeter (or other specialized medical testing equipment) and is not a physiological parameter that the devices would simulate.

26. B: aVF is one of three augmented leads that measures the voltage differential with a positive end inferior to the heart (LL) and using the RA and LA electrodes as negative ends, whereas aVR and aVL instead use RA and LA as the positive electrodes, respectively. These augmented leads view the heart at angles rotated 60° from the three standard leads (I–III). The V1 lead (A) is one of six precordial leads that use six electrodes and view the heart horizontally.

27. D: The force of blood pressure motivates filtration in the kidneys. Filtration is the process through which the kidneys remove waste products from the body. All of the water in the blood passes through the kidneys every 45 minutes. Waste products are diverted into ducts and excreted

from the body, whereas the healthy components of the water in blood are reabsorbed into the bloodstream. Peristalsis is the set of involuntary muscle movements that move food through the digestive system.

28. C: An intermittent infusion uses programmable settings of an infusion pump to administer a drug at a high rate during regular intervals. This mode of pumping is useful for drugs that might irritate the blood vessel through which it is being administered. The infusion continues at a low rate between administrations to assure that the cannula does not close. Thus, the amount of drug infused during the low-rate periods is rather small, so the infusion cannot be called "oscillating." Continuous infusion consists of low-dose pulses over an extended period. No type of infusion is called "standard."

29. D: Syringe pumps are used for the injection of highly potent medications or slow administration of a drug via mechanical depression of a syringe. The pumps make use of existing syringes with high precision and can be set to provide small doses over time, thus choice D is correct.

30. A: The GHS provides several mandatory requirements; however, it also provides some suggested but non-mandatory standards, such as including the carcinogenicity of a substance in animal testing, although labelling human carcinogenicity is mandatory. GHS defines and requires labelling of pyrophoric substances, which are any substances that can ignite within 5 minutes of contact with air. GHS requires that hazard terminology is used consistently, is not mixed, and requires inclusion of safe handling and storage measures in safety data sheets.

31. B: Our respiratory system inhales air, of which oxygen is one component. From that inhaled air, the respiratory system delivers oxygen to the body. Through gas exchange, it then expels carbon dioxide (CO_2) from the body as we exhale. The respiratory system obtains oxygen from the air we inhale; it does not create it, and it expels CO_2 rather than absorbing it (C). We do not use our respiratory systems to exhale oxygen or inhale CO_2 (D).

32. B: Root cause analysis is used to seek out the underlying cause of failure, not the apparent causative action or where the problem occurred and then determine a solution for the underlying problem. Although root cause analysis is able to improve quality through solutions developed, failure prevention is the objective. Root cause analysis is not directly focused on cost reduction.

33. C: The missing resistance can be found by the proportion of known resistances:

$$\frac{R_1}{R_2} = \frac{R_x}{R_3}$$

Rearranging the equation to solve for R_x gives:

$$R_x = \frac{R_1}{R_2} \times R_3$$

Substituting the appropriate valuesgives the value of R_x, 3.2 Ω:

$$R_x = \frac{9.8\ \Omega}{5.8\ \Omega} \times 1.9\ \Omega = 3.2\ \Omega$$

34. A: Capnography specifically measures end-tidal carbon dioxide as an indicator of the patient's respiratory health and can identify signs of hypoxia. High oxygen levels are mainly measured for infants to prevent damaging oxygen toxicity. Respiration rate is a vital sign measured by ventilators