BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Sc.(CCT)-2021/B.Sc.(CCT)-2022
Course Name – Arterial Blood Gases
Course Code - BCCTC501
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Interpret- A 40-year-old female with a history of diabetes mellitus presents with nausea, vomiting, and abdominal pain. Her ABG results are: pH: 7.25 $PaCO_2$: 30 mmHg HCO_3^-: 16 mEq/L PaO_2: 95 mmHg

a) Metabolic acidosis with respiratory compensation
b) Respiratory acidosis with renal compensation
c) Metabolic alkalosis with respiratory compensation
d) Mixed respiratory and metabolic alkalosis

(ii) Interpret- A 65-year-old male with a history of COPD presents with increased shortness of breath. His ABG results are: pH: 7.32 $PaCO_2$: 55 mmHg HCO_3^-: 28 mEq/L PaO_2: 65 mmHg

a) Respiratory acidosis
b) Metabolic acidosis
c) Metabolic alkalosis
d) Respiratory alkalosis

(iii) Select the condition is indicated by a pH below 7.35 in an ABG analysis.

a) Respiratory acidosis
b) Respiratory alkalosis
c) Metabolic acidosis
d) Metabolic alkalosis

(iv) Write normal range for HCO3- (bicarbonate) levels in arterial blood.

a) 22 - 28 mEq/L
b) 7.35 - 7.45
c) 80 - 100 mmHg
d) 35 - 45 mmHg

(v) In an ABG analysis, Select the condition is indicated by an elevated HCO3- level.

a) Metabolic alkalosis
b) Metabolic acidosis
c) Respiratory alkalosis
d) Respiratory acidosis

(vi) Select the following is an example of a compensatory response in ABG analysis.

a) Elevated pH in metabolic acidosis
b) Decreased PaCO2 in respiratory alkalosis

c) Elevated HCO3- in respiratory acidosis
d) Decreased PaO2 in hyperventilation

(vii) Identify the base excess (BE) value represent in an ABG report.

a) The concentration of bicarbonate (HCO3-) ions
b) The degree of metabolic alkalosis
c) The amount of buffer capacity in the blood
d) The excess or deficit of base in the blood

(viii) Select the condition is indicated by a low PaO2 and a high PaCO2 in ABG analysis.

a) Metabolic acidosis
b) Respiratory alkalosis
c) Respiratory acidosis
d) Metabolic alkalosis

(ix) Select the following is a potential risk when withdrawing arterial blood from the radial artery.

a) Nerve damage
b) Phlebitis
c) Infection
d) Anemia

(x) Show what does the pO2 (oxygen pressure) measures in ABG interpreats.

a) Oxygen content in the blood
b) Oxygen saturation
c) Oxygen-carrying capacity of hemoglobin
d) Oxygen tension in the alveoli

(xi) State- In ABG analysis, a high HCO3- level indicate.

a) Metabolic alkalosis
b) Metabolic acidosis
c) Respiratory alkalosis
d) Respiratory acidosis

(xii) Write purpose of heparin in an ABG syringe.

a) To prevent clotting of the sample
b) To increase the oxygen content in the sample
c) To improve the accuracy of pH measurement
d) To decrease the sample volume

(xiii) Select the type of ABG machine is known for its portability and ability to provide rapid results.

a) Benchtop ABG machine
b) Point-of-care ABG machine
c) Laboratory-based ABG machine
d) Handheld ABG machine

(xiv) Select the type of ABG machine is most commonly used in clinical laboratories and hospitals for routine testing.

a) Benchtop ABG machine
b) Point-of-care ABG machine
c) Laboratory-based ABG machine
d) Handheld ABG machine

(xv) Select a significant advantage of laboratory-based ABG machines.

a) Portability
b) Low cost
c) High throughput
d) Quick results

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the complications can arise from ABG sampling. (3)
3. Define an Arterial Blood Gas (ABG) machine, and what are its primary functions (3)
4. Explain Allen Test with it's importance. (3)
5. Explain how does the body compensate for metabolic acidosis, and write the consequences for ABG values. (3)
6. A diabetic patient presents with deep, rapid breathing (Kussmaul respirations). ABG shows a pH of 7.10, PaCO2 of 20 mm Hg, and HCO3- of 10 mEq/L. Write the diagnosis, and the expected compensation. (3)

OR

A patient on mechanical ventilation has ABG results of pH 7.50, PaCO2 30 mm Hg, and HCO3- 24 mEq/L. Observe the reason for this alkalosis, and Write the management. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Establish the anatomical landmarks and techniques used for locating and accessing the radial artery as a common puncture site for ABG sampling. Discuss the advantages and disadvantages of using the radial artery. (5)
8. Describe the step-by-step procedure for accessing the brachial artery as an alternative site for arterial blood sampling in ABG analysis. (5)
9. Summarize the indications for performing an arterial blood gas analysis, and provide examples of clinical scenarios where ABG testing is crucial for patient management. (5)
10. Summarize the strategies implemented to streamline the transportation process for ABG samples while maintaining sample quality and safety. (5)
11. A 35-year-old woman with type 1 diabetes is brought to the emergency department by ambulance after being found severely unwell in her house. Following a discussion with her partner it emerges she has not been eating for the past few days due to a vomiting illness and, as a precaution, has also been omitting her insulin. Pulse 130 beats/min Blood pressure 100/60 mmHg Respiratory rate 26 breaths/min BM (blood glucose) >25 mmol/L ABG report: pH: 7.05, PCO2: 11 mmHg, PO2: 187 mmHg, Bicarb: 6.0 mmol/L, BE −25.2 mmol/L, SO2: 99.8% (>96%). Illustrate her gas exchange. Describe her acid–base status. Write the diagnosis. (5)
12. Write the technique for inserting the needle and the depth at which it should be inserted into the artery. (5)

OR

Write the specific safety measures and infection control practices should healthcare professionals adapt at the time of performing arterial blood withdrawal for ABG analysis to prevent complications and ensure patient comfort. (5)

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