



14740

**BRAINWARE UNIVERSITY**LIBRARY
Brainware University
Barasat, Kolkata -700125

Term End Examination 2025-2026

Programme – B.Sc.(CCT)-2021/B.Sc.(CCT)-2022/B.Sc.(CCT)-2023

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 50-year-old male with a history of chronic diuretic use for hypertension presents with muscle weakness and cramps. His ABG results are: pH: 7.47 PaCO₂: 46 mmHg HCO₃⁻: 32 mEq/L PaO₂: 92 mmHg
 - a) Metabolic alkalosis
 - b) Respiratory alkalosis
 - c) Metabolic acidosis
 - d) Respiratory acidosis
 - (ii) Select the way a healthcare professionals dispose of used needles and syringes used in arterial blood withdrawal.
 - a) Recycle them in the regular waste bin.
 - b) Place them in a sharps container.
 - c) Flush them down the toilet.
 - d) Bury them in the ground.
 - (iii) Select the parameter is used to evaluate oxygen-carrying capacity in ABG analysis.
 - a) pH
 - b) PaO₂
 - c) PaCO₂
 - d) SaO₂
 - (iv) Select the following is NOT a typical site for ABG sampling.
 - a) Earlobe
 - b) Radial artery
 - c) Brachial artery
 - d) Femoral artery
 - (v) Write primary purpose of an ABG machine's gas analyzer module.
 - a) To measure blood pressure
 - b) To analyze the pH of arterial blood
 - c) To monitor heart rate
 - d) To measure glucose levels
 - (vi) Write typical measurement range for the partial pressure of oxygen (PaO₂) in arterial blood when using an ABG machine.
 - a) 0-100 mm Hg
 - b) 0-10 mm Hg
 - c) 0-500 mm Hg
 - d) 0-50 mm Hg
 - (vii) Select the feature of ABG machines allows healthcare professionals to calibrate and verify the accuracy of measurements.
 - a) Quality control module
 - b) Blood pressure cuff
 - c) Wireless connectivity
 - d) ECG monitor

- (viii) In addition to pH and blood gases, select a other parameter can an ABG machine measure.
- a) Blood sugar levels
c) Red blood cell count
- b) Electrolyte concentrations
d) White blood cell count
- (ix) Write primary acid-base disturbance in a patient with a pH of 7.52, pCO₂ of 28 mmHg, and HCO₃⁻ of 32 mEq/L.
- a) Metabolic acidosis
c) Metabolic alkalosis
- b) Respiratory acidosis
d) Respiratory alkalosis
- (x) Choose the write answer - A 55-year-old female with a history of chronic lung disease presents with worsening dyspnea. ABG shows pH 7.25, PaCO₂ 50 mm Hg, and HCO₃⁻ 24 mEq/L. Write acid-base disturbance.
- a) Respiratory acidosis
c) Metabolic acidosis
- b) Respiratory alkalosis
d) Metabolic alkalosis
- (xi) Select the component of an ABG machine is responsible for drawing blood from the patient's artery.
- a) Electrolyte sensor
c) pH electrode
- b) Syringe pump
d) Spectrophotometer
- (xii) Identify the acid base disturbance of the patient having - pH- 7.32, Pco₂- 29.70mmHg, HCO₃⁻ 16.4 po₂-72.3
- a) Compensated respiratory acidosis
c) Compensated metabolic alkalosis
- b) Compensated metabolic acidosis
d) Mixed acidosis
- (xiii) Tell - When collecting the arterial blood gas (ABG) sample, you should use a specific syringe, which also contains:
- a) coagulase
c) heparin
- b) potassium
d) warfarin
- (xiv) In some situations, a venous blood gas (VBG) will provide adequate information. As compared to an ABG, the VBG results will:
- a) show a different haemoglobin level
c) show a different oxygenation level
- b) show all values the same as the arterial values
d) show a different potassium level
- (xv) A patient presents with a pH of 7.52, PaCO₂ of 28 mmHg, and HCO₃⁻ of 22 mEq/L. Identify the primary acid-base disturbance.
- a) Metabolic acidosis
c) Respiratory acidosis
- b) Metabolic alkalosis
d) Respiratory alkalosis

Group-B

(Short Answer Type Questions)

3 x 5=15

- A patient with severe diarrhoea, complains of diifficulty in breathing. pH- 7.1, HCO₃⁻ - 14mEq/L, Pco₂- 44mmHg, k+- 2.0mEq/L. Interpret, Check Ph, expected compensation. (3)
- Discuss the disadvantages of brachial artery cannulation. (3)
- Explain why the radial artery the preferred site for ABG sampling. (3)
- Illustrate about the Allen's test and write it's importance. (3)
- A postoperative patient is hyperventilating and anxious. ABG reveals a pH of 7.48, PaCO₂ of 30 mm Hg, and HCO₃⁻ of 24 mEq/L. Evaluate primary acid-base disturbance, and write it's likely cause. (3)

OR

A patient with severe vomiting has ABG results of pH 7.55, PaCO₂ 40 mm Hg, and HCO₃⁻ 32 mEq/L. Evaluate acid-base imbalance is present, and the likely cause. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. pH = 7.20 PaCO₂ = 38 mmHg HCO₃⁻ = 15 mEq/L. Conclude the expected interpretation, Ph validity, expected compensation. (5)
8. Write the procedure of Allen's test and why is it essential before choosing the radial artery as the puncture site. (5)
9. Explain the principles of operation behind blood gas electrodes in ABG analyzers. (5)
10. A 75-year-old man is brought into the emergency department by his family. He is extremely short of breath and struggling to speak. Following a conversation with his family, it emerges that he has a long history of chronic obstructive pulmonary disease. Over the last 3 days his breathing has worsened considerably and he has expectorated increased volumes of sputum. Pulse 120 beats/min, Respiratory rate 26 breaths/min, Blood pressure 150/80 mmHg, Temperature 36°C, SaO₂% - 81%. ABG report: pH: 7.40, PCO₂: 36 mmHg, PO₂: 44 mmHg, Bicarb: 23 mmol/L, BE -1.2 mmol/L, SO₂: 80%. Interpret his acid base balance. (5)
11. Case: A 79-year-old woman has just been admitted to the general surgical ward to have a large bowel tumour surgically removed. The tumour was discovered at colonoscopy after she presented to her doctor with a 6-month history of rectal bleeding. On admission, she appears to be severely short of breath and extremely tired. Further questioning reveals that her rectal blood loss has been no greater than usual. Pulse 100 beats/min Blood pressure 100/80 mmHg Respiratory rate 24 breaths/min SaO₂% (on air) 100% ABG report: pH 7.49 (7.35-7.45) PCO₂: 25 mmHg, PO₂: 89 mmHg, Bicarb 22 mmol/L, BE -2 mmol/L SO₂: 99.8%. Write the most likely cause of her breathlessness. Discuss the most effective way of improving O₂ delivery to her tissues. (5)
12. As a healthcare provider, you are presented with the arterial blood gas (ABG) results of a patient who has been admitted to the emergency department. The ABG results are as follows: pH: 7.25 PaO₂: 70 mm Hg PaCO₂: 60 mm Hg HCO₃⁻: 28 mEq/L Write the interpretation of these ABG results and outline the appropriate interventions and potential underlying conditions or causes associated with these findings. (5)

OR

Write the key considerations when transporting arterial blood gas (ABG) samples from a clinical setting to a laboratory for analysis, and discuss why is proper transportation crucial. (5)

LIBRARY
Brainware University
Barasat, Kolkata -700125