



AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF REHABILITATION MEDICINE

BACHELOR OF SCIENCE IN PHYSIOTHERAPY

END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2023

UNIT CODE: PHT 127

UNIT NAME: HUMAN PHYSIOLOGY II

DATE: 19TH APRIL 2024

TIME: 9AM-11AM

INSTRUCTIONS

- 1. All students will have two (2) hours to complete the examination**
- 2. Attempt all questions as per the instruction**
- 3. It is the student's responsibility to report any page and number missing in this paper.**
- 4. Check that the paper is complete**
- 5. Total number of pages is 9 including the cover.**
- 6. Read through the paper quickly before you start.**

MCQ section (40 marks)

1. Which term refers to the process of breathing involving the movement of air into and out of the lungs?
 - a) Pulmonary circulation
 - b) Ventilation
 - c) Spirometry
 - d) Respiration

2. The maximum amount of air that can be exhaled after a maximum inhalation is known as:
 - a) Tidal volume
 - b) Inspiratory reserve volume
 - c) Expiratory reserve volume
 - d) Forced vital capacity

3. The ratio of the volume of air that reaches the alveoli to the volume of blood perfusing the alveolar capillaries is called:
 - a) Ventilation-perfusion ratio
 - b) Respiratory minute volume
 - c) Pulmonary circulation ratio
 - d) Alveolar ventilation rate

4. Which of the following factors affects the oxygen-hemoglobin dissociation curve?
 - a) pH
 - b) Temperature
 - c) Partial pressure of oxygen
 - d) All of the above

5. The primary form of carbon dioxide transport in the blood is:
 - a) Dissolved in plasma
 - b) Bound to hemoglobin
 - c) As bicarbonate ions
 - d) In combination with chloride ions

6. The functional unit of the kidney responsible for urine formation is called:

- a) Nephron
- b) Glomerulus
- c) Tubule
- d) Renal corpuscle

7. Glomerular filtration rate (GFR) is primarily regulated by changes in:

- a) Blood pressure
- b) Blood pH
- c) Glucose levels
- d) Sodium levels

8. Which substance is commonly used to estimate GFR in clinical practice?

- a) Insulin
- b) Creatinine
- c) Inulin
- d) Glucose

9. Tubular reabsorption primarily occurs in which part of the nephron?

- a) Proximal convoluted tubule
- b) Loop of Henle
- c) Distal convoluted tubule
- d) Collecting duct

10. The process of concentrating urine involves the:

- a) Proximal convoluted tubule
- b) Loop of Henle
- c) Distal convoluted tubule
- d) Collecting duct

11. Saliva aids in the digestion of:

- a) Carbohydrates
- b) Proteins
- c) Fats
- d) Vitamins

12. Swallowing is coordinated by the:

- a) Pharynx
- b) Esophagus
- c) Stomach
- d) Small intestine

13. Gastric juice is composed mainly of:

- a) HCl and pepsinogen
- b) Lipase and amylase
- c) Trypsin and bile
- d) Insulin and glucagon

14. Gastrin is a hormone that stimulates:

- a) Gastric motility
- b) Pancreatic secretion
- c) Bile production
- d) Intestinal absorption

15. The primary function of the liver includes:

- a) Carbohydrate digestion
- b) Protein synthesis
- c) Fat storage
- d) Vitamin D metabolism

16. The process of bile secretion is regulated by the hormone:
- a) Gastrin
 - b) Insulin
 - c) Cholecystokinin
 - d) Secretin
17. Intestinal motility is primarily regulated by:
- a) Gastrin
 - b) Secretin
 - c) Cholecystokinin
 - d) Enteric nervous system
18. The mechanism of defecation involves the contraction of which muscle?
- a) Diaphragm
 - b) Rectus abdominis
 - c) External anal sphincter
 - d) Internal anal sphincter
19. The production of acidic chyme in the stomach stimulates the release of:
- a) Gastrin
 - b) Secretin
 - c) Cholecystokinin
 - d) Somatostatin
20. The term "micturition" refers to:
- a) Swallowing
 - b) Urination
 - c) Digestion
 - d) Defecation

21. What term describes the maximum volume of air that can be exhaled after a maximum inhalation?

- a) Inspiratory reserve volume
- b) Expiratory reserve volume
- c) Residual volume
- d) Vital capacity

22. Which of the following represents the sum of tidal volume and inspiratory reserve volume?

- a) Expiratory reserve volume
- b) Inspiratory capacity
- c) Functional residual capacity
- d) Total lung capacity

23. The ventilation-perfusion ratio is primarily regulated by:

- a) Respiratory centers in the brainstem
- b) Blood pressure changes in the pulmonary arteries
- c) Diameter of the bronchioles
- d) Diameter of the pulmonary arterioles

24. Which of the following is NOT a mechanism of carbon dioxide transport in the blood?

- a) Dissolved in plasma
- b) Bound to hemoglobin
- c) As bicarbonate ions
- d) As free carbon dioxide molecules

25. The oxygen-hemoglobin dissociation curve shifts to the right under conditions of:

- a) Hypoxia
- b) Alkalosis
- c) Hypercapnia
- d) Increased Ph

26. What is the term for the volume of air remaining in the lungs after a maximal expiration?
- a) Inspiratory reserve volume
 - b) Expiratory reserve volume
 - c) Residual volume
 - d) Vital capacity
27. Which of the following factors does NOT affect the oxygen-hemoglobin dissociation curve?
- a) pH
 - b) Temperature
 - c) Partial pressure of carbon dioxide
 - d) Partial pressure of oxygen
28. In which part of the nephron does most of the reabsorption of filtered substances occur?
- a) Proximal convoluted tubule
 - b) Distal convoluted tubule
 - c) Loop of Henle
 - d) Collecting duct
29. The glomerular filtration rate (GFR) is primarily regulated by changes in:
- a) Blood pressure in the renal artery
 - b) Diameter of the afferent arteriole
 - c) Concentration of sodium in the filtrate
 - d) Sympathetic stimulation of the kidneys
30. Which of the following substances is NOT typically reabsorbed in the renal tubules?
- a) Sodium ions
 - b) Glucose
 - c) Urea
 - d) Creatinine

31. The process of concentrating urine occurs mainly in the:
- a) Proximal convoluted tubule
 - b) Loop of Henle
 - c) Distal convoluted tubule
 - d) Collecting duct
32. What is the primary buffer system in the blood that helps maintain acid-base balance?
- a) Bicarbonate buffer system
 - b) Phosphate buffer system
 - c) Protein buffer system
 - d) Carbonic acid buffer system
33. Which of the following is a function of the liver?
- a) Production of insulin
 - b) Storage of bile
 - c) Production of pancreatic enzymes
 - d) Detoxification of drugs and toxins
34. The principle of hemodialysis relies on:
- a) Filtering blood through a semipermeable membrane
 - b) Transplanting a healthy kidney into the body
 - c) Stimulating urine production with diuretics
 - d) Administering dialysis solution orally
35. What hormone stimulates the secretion of gastric juice in the stomach?
- a) Insulin
 - b) Glucagon
 - c) Gastrin
 - d) Cholecystokinin

36. Which of the following is NOT a function of saliva?

- a) Lubrication of food particles
- b) Neutralization of stomach acid
- c) Initiation of carbohydrate digestion
- d) Protection against oral bacteria

37. The process of swallowing is also known as:

- a) Deglutition
- b) Mastication
- c) Peristalsis
- d) Bolus formation

38. Gastric motility is primarily controlled by:

- a) Parasympathetic nervous system
- b) Sympathetic nervous system
- c) Enteric nervous system
- d) Central nervous system

39. Which of the following is NOT a function of the liver?

- a) Carbohydrate metabolism
- b) Protein synthesis
- c) Regulation of body temperature
- d) Detoxification of drugs and toxins

40. Intestinal motility is primarily regulated by:

- a) Parasympathetic nervous system
- b) Sympathetic nervous system
- c) Enteric nervous system
- d) Central nervous system

SHORT ESSAY QUESTIONS (Total 30 Marks)

41. Explain the significance of vital capacity in assessing pulmonary function. Describe how vital capacity is measured and discuss its clinical relevance. (5 marks)
42. Discuss the factors that affect the oxygen-hemoglobin dissociation curve. Explain how changes in pH, temperature, and partial pressure of carbon dioxide influence the binding and release of oxygen by hemoglobin. (5 marks)
43. Describe the process of glomerular filtration in the nephron. Explain the factors that determine the glomerular filtration rate (GFR) and discuss its clinical importance. (5 marks)
44. Discuss the reabsorption of glucose in the renal tubules, including the role of transporters and the significance of tubular maximum (T_m) values. (5marks)
45. Discuss how the respiratory and renal systems contribute to acid-base regulation. (6 marks)
46. Discuss the functions of the liver in digestion and metabolism. (5marks)