



*(Knowledge for Development)*

**KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS 2021/2022**

**ACADEMIC YEAR**

**FIRST YEAR FIRST TRIMESTER**

**SUPPLEMENTARY EXAMINATION**

**FOR BACHELOR OF SCIENCE IN NURSING DEGREE**

**COURSE CODE: NUR 114**

**COURSE TITLE: MEDICAL PHYSIOLOGY1**


**DATE: 20/09/2022**

**TIME: 2.00pm- 5.00pm**

**INSTRUCTIONS TO CANDIDATES**

Answer ALL Section one (1) MULTIPLE CHOICE QUESTIONS and ALL Section two (2) SHORT ANSWER QUESTIONS and any one (1) section THREE (3) LONG ANSWER QUESTION.

TIME: 3 Hours

This paper consists of 7 printed pages. Please Turn Over   
**KIBU observes ZERO tolerance to examination cheating**

**PART ONE: MULTIPLE CHOICE QUESTIONS (MCQs)**

1. The group that as a high percentage of body weight in form of water because of a relatively large ECF volume and little fat are:
  - a) Newborns.
  - b) Young adults.
  - c) Women.
  - d) Men.
2. The most plentiful electrolyte in the extracellular fluid is:
  - a) Sodium.
  - b) Potassium.
  - c) Calcium.
  - d) Chloride.
3. The speed at which action potentials are propagated within the cardiac tissue is:
  - a) Conductivity.
  - b) Conduction velocity.
  - c) Excitability.
  - d) Excitation-contraction coupling.
4. Osmosis is a special case of
  - a. Filtration
  - b. active transport
  - c. carrier transport
  - d. diffusion
5. Which is statement is true about secondary active transport and primary active transport?
  - a. Both require energy from hydrolysis of ATP
  - b. Only primary active transport requires hydrolysis of ATP
  - c. ATP hydrolysis indirectly drives secondary active transport while it directly drives primary active transport
  - d. None is true
6. The rate of facilitated diffusion?
  - a. Depends on the concentration gradient
  - b. The water solubility of the cargo
  - c. The number of membrane transport proteins available
  - d. A and C are correct
7. Which of the following best describes homeostasis?
  - a. Keeping the body in a fixed and constant state
  - b. Dynamic equilibrium of the internal environment
  - c. Maintaining a near constant internal environment
  - d. Altering the external environment to accommodate the body's needs
8. The resting membrane potential?
  - a. occurs only in nerve and muscle cells.
  - b. Is the same in all cells
  - c. requires the separation of most of the cell's charged particles.
  - d. none of the above
9. Red blood cells
  - a. Rely on glycolysis for energy production
  - b. Rely on energy from mitochondria for cell functions
  - c. Hold a high concentration of carbonic anhydrase enzyme
  - d. A and C are correct
  - e. None is correct

10. Which of the following statements regarding the nucleus are true?
- The nucleoli is the site of synthesis of ribosomes
  - The nuclear membrane is a solid, impermeable membrane
  - In non dividing cells the DNA exists as chromatid in the nucleus
  - Protein synthesis occurs within the nucleus
11. Which is true about the distribution of  $\text{Na}^+$  and  $\text{K}^+$  ions across the plasma membrane of cells at resting membrane potential?
- The outward flow of  $\text{K}^+$  is favored by concentration gradient and opposed by electrochemical gradient
  - The inward flow of  $\text{Na}^+$  is favored by the electrochemical and concentration gradient
  - The outward flow of  $\text{K}^+$  is favored by the electrochemical gradient and concentration gradient
  - A and B are correct
12. Which of the following is true about endocytosis?
- Phagocytosis and receptor mediated endocytosis both involve use of membrane receptor protein
  - Pinocytosis occurs by way of receptor proteins
  - Phagocytosis involves transfer of substances from the interior of the cell to the exterior of the cell
  - All are true
13. Hemopoiesis
- Refers to synthesis of the bone marrow from hemopoietic stem cells
  - Refers to synthesis of red blood cells only
  - Generally occurs in red marrow in fetal life
  - None of the above is correct
14. Erythropoiesis
- Requires the availability of iron
  - Requires the availability of folic acid
  - Requires the availability of vitamin B12
  - All the above are correct
15. Erythropoietin
- Is essential for synthesis of thrombocytes
  - Is produced by the liver only
  - Directs myeloid synthesis to preferably produce megakaryocytes
  - None is correct
16. White blood cells
- Are exclusively housed inside the blood vessels after maturity
  - Are cell of defense predominantly
  - Are predominantly derived from the lymphoid series of hemopoiesis
  - Are all granular in appearance
17. Thirst is stimulated by:-
- Increased plasma osmolality and volume
  - Increased plasma osmolality and a decrease in plasma volume
  - Decreased plasma osmolality and volume
  - Decreased plasma osmolality and a increase in plasma volume

18. Secondary active transport
- Directly utilizes ATP as source of energy
  - Relies on glycolysis for energy
  - Is undertaken by membrane channels
  - None of the above is correct
19. Anemia
- Is insufficient oxygen carrying capacity in blood
  - Is mostly due to failure in the lymphoid series of hemopoiesis
  - Is mostly due to failure of thrombopoietin secretion
  - Principally occurs due to dehydration
20. All the listed functions are performed by the smooth endoplasmic reticulum except ?
- Storage of calcium ions
  - Detoxification of potentially harmful agents
  - Synthesis of lipids
  - None of the above is correct
21. Rhesus positive mother ?
- Will safely deliver a rhesus positive baby as their first born
  - Rhesus positive second baby is at risk of developing hemolysis and death in utero
  - Will always deliver safely any rhesus negative child
  - All the above are correct
22. Which statement is incorrect regarding plasma membrane lipids ?
- Demarcate the boundary of the cell
  - Are essential transmembrane transport molecules
  - Allow membrane transport mainly by way of diffusion
  - Are mostly phospholipids
23. Which statement is incorrect concerning membrane channels?
- Voltage gated channels are opened and closed by local changes in ion gradients
  - Ligand gated channels are opened and closed by binding to specific chemical messengers
  - Mechanically gated channels are opened and closed by mechanical forces
  - None of the above is correct
24. During the rising phase of an action potential,
- Voltage-gated Na<sup>+</sup> channels open.
  - Voltage-gated K<sup>+</sup> channels open.
  - Voltage-gated Na<sup>+</sup> channels close.
  - Voltage-gated K<sup>+</sup> channels close.
  - A and D
25. The site where most of the ATP is generated in a cell is the
- Nucleus
  - Mitochondria
  - Golgi Apparatus
  - Plasma Membrane
26. The term used to describe, 'cell eating' is?
- Pinocytosis
  - Phagocytosis
  - Diffusion
  - Exocytosis

27. Which one of the following is not found on the cell membrane?
- A. Cholesterol
  - B. Phospholipids
  - C. Galactose
  - D. Nucleic acids
28. Protein synthesis occurs at the:
- A. Lysosomes
  - B. Within the nucleus
  - C. Ribosomes
  - D. Mitochondria
29. The membrane potential at rest is called:
- A. Transmembrane potential
  - B. Action potential
  - C. Nerve cell membrane potential
  - D. Metabolically quiescent
30. The life span of Red Blood Cells is
- A. 100 days
  - B. 110 days
  - C. 120 days
  - D. 150 days
31. Cell membrane carbohydrate:
- a. Have secretory vesicles
  - b. Give most of cells overall -ve surface charge
  - c. Is the aqueous content of the cell
  - d. Serve as matrix substance which chemical reactions occur
32. Which of the following is responsible for the red colour of blood?
- A. Hemocyanin
  - B. Myoglobin
  - C. Haemoglobin
  - D. Iron
33. Erythrocyte production
- A. occurs in the liver and spleen in neonates
  - B. is impaired at high altitude
  - C. is stimulated by hyperoxia
  - D. is stimulated by erythropoietin released from the liver and spleen
34. Which of the following is true about the conduction of action potentials?
- A. A thicker axons conduct action potentials faster because there is a faster current flow in thicker axons
  - B. action potentials travel faster in unmyelinated nerve fibres than myelinated nerve fibres
  - C. the action potential in myelinated axons is generated only at the nodes of Ranvier
  - D. the action potential in an unmyelinated nerve has an amplitude that declines with distance from its site of origin
35. The name given to the iron-containing protein that gives red blood cells their colour is:
- A. Hemocyanin
  - B. Pyrite
  - C. Hemoglobin
  - D. Myoglobin

36. Most cell membranes are composed principally of
- DNA and ATP
  - proteins and lipids
  - chitin and starch
  - nucleotides and amino acids
37. The sodium–potassium ATPase (sodium pump) is
- A symporter
  - An uniporter
  - An antiporter
  - An example of secondary active transport
38. Which one of the following is not true with respect to homeostasis?
- It provides a steady state within the organism
  - Metabolism is the character of all living things used in maintaining homeostasis
  - It is controlled partly by the external environment
  - It is maintained by positive and negative feedback system
39. Which of the following is characterized by carrier-mediated transport down a chemical concentration gradient?
- active transport
  - facilitated diffusion
  - diffusion
  - osmosis
40.  $\text{Na}^+$  is moving to the interior causing other substance to move out, this process is called
- Symport
  - Antiport
  - Symport and Antiport
  - None of the above
41. During the rising phase of an action potential
- voltage-gated  $\text{Na}^+$  channels open
  - voltage-gated  $\text{K}^+$  channels open
  - voltage-gated  $\text{Na}^+$  channels close
  - voltage-gated  $\text{K}^+$  channels close
42. Which one of the following is not true about the organelles?
- Cell membranes are semi permeable membranes
  - Cytoplasm is made of cytosol with no cytoskeleton
  - The nucleus is the control center for cells
  - The mitochondria is the power plant for the cells
43. In cellular communication which one of the following is not true?
- There is restriction of growth in the cellular Interphase
  - There is cytoplasm communication to various organelles
  - Cellular communication with the outside occurs through receptors and hormonal responses
  - Lysosomes have no role in communication
44. Which blood type has both the Antibodies against both type A and type B antigens
- Type A
  - Type B.
  - Type AB
  - Type O

45. Which one of the following is not found on the cell membrane?
- Cholestral
  - Phospholipids
  - Galactose
  - Nucleic acids
46. Protein synthesis occurs at the:
- Lysosomes
  - Within the nucleus
  - Ribosomes
  - Mitochondria
47. The structure and activity of cellular proteins are also affected by:
- Fluid intake.
  - Salt concentration or ionic strength.
  - Buffers.
  - Electrolytes concentration.
48. The term used for the maintenance of steady states in the body by coordinated physiological mechanisms is:
- Physiological mechanisms.
  - Biochemical mechanisms.
  - Homeostasis.
  - Metabolic balance.
49. In a feedback system, the response of the system “feeds back” information to change the controlled variable in some way is:
- Positive feedback.
  - Negative feedback.
  - Non response.
  - Either *negating* it (negative feedback) or enhancing it (positive feedback).
50. The PH range of blood is
- 7.35-7.45
  - 2.25-3.45
  - 7.45-8.45
  - 4.5-7.5

**PART TWO: SHORT ANSWER QUESTIONS (SAQs)**

- Discuss the origin of nutrients in the Extracellular fluids (6 Marks)
- Outline three (3) major ways in which abnormal fluid loss may occur leading to physiological imbalance. (6 Marks)
- Giving examples for each outline two (2) types of mechanisms that are responsible for transport of substances across cell membranes. (6 Marks)
- Describe the 3 major cellular components of blood(6 Marks)
- Describe briefly about the types and functions of white blood cells in the body(6 Marks)

**PART THREE: LONG ANSWER QUESTIONS (LAQs)**

- Discuss the various homeostatic processes occurring in human physiology ( 20 Marks)
- Discuss in details the generation and conduction of action potential.( 20 Marks)