

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATION**

**RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS  
EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN  
NURSING (UPGRADING)**

**NURU 113: MEDICAL PHYSIOLOGY I**

**STREAMS:**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 10/08/2021**

**2.30 P.M - 4.30 P.M.**

**INSTRUCTIONS**

1. Do not write anything on the question paper.
2. The paper has three sections. Answer ALL questions in Sections I and II and ONE question in section III.
3. All your answers for Section I (MCQs) should be on one page.
4. Number ALL your answers and indicate the order of appearance in the space provided in the cover page of the examination answer booklet.

**Section A: Multiple Choice Questions (20 marks)**

1. Which of the following characteristics is shared by simple diffusion and facilitated diffusion?
  - a) Transport solute against concentration gradient
  - b) Can be blocked by specific inhibitors
  - c) Do not require adenosine triphosphate (ATP)
  - d) Require transport protein
2. The non-polar tails of phospholipids of the plasma membrane are:
  - a) Hydrophilic
  - b) Hydrophobic
  - c) Permeable to water soluble molecules

- d) Impermeable to fat soluble molecules
3. Antibodies belong to a class of plasma proteins called
- a) Albumins
  - b) Gamma globulins
  - c) Beta globulins
  - d) Agglutinins
4. The following is not a component of hemostasis?
- a) Platelet plug formation
  - b) Agglutination
  - c) Clot retraction
  - d) Vascular spasm
5. Phase 0 of the cardiac actionpotential results from?
- a)  $K^+$  efflux
  - b) The closing of  $K^+$  channels
  - c) The open of fast  $Na^+$  channels
  - d)  $Ca^{2+}$ influx
6. The blood contained in a ventricle during isovolumetric relaxation is
- a) The end-systolic volume
  - b) The end-diastolic volume
  - c) The stroke volume
  - d) The ejection fraction
7. The velocity of blood flow decreases if:
- a) Vessel radius increases
  - b) Blood pressure decreases
  - c) Viscosity increases
  - d) Afterload increases

8. The cardiac conduction system includes all of the following except
  - a) The SA node
  - b) The AV node
  - c) The bundle branches
  - d) The chordae tendinae
  
9. The cotransport of glucose derives energy from
  - a)  $\text{Na}^+$  concentration gradient
  - b) The glucose molecule being transported
  - c)  $\text{Ca}^{2+}$  gradient
  - d) The membrane voltage
  
10. The following is TRUE concerning the plasma membrane:
  - a) It is selectively permeable to substances in the body
  - b) It is made up entirely of proteins
  - c) It does not contain lipids
  - d) It is made up entirely of carbohydrates
  
11. Osmosis is a special case of
  - a) Pinocytosis.
  - b) Carrier-mediated transport
  - c) Facilitated diffusion
  - d) Simple diffusion
  
12. Some neurotransmitters can have either excitatory or inhibitory effects depending on the type of:
  - a) Receptors on the postsynaptic neuron
  - b) Synaptic vesicles in the axon
  - c) Synaptic potentiation that occurs
  - d) Postsynaptic potentials on the synaptic knob

13. The following metabolic process is not a function of the smooth endoplasmic reticulum:
- a) Fat metabolism
  - b) Synthesis of cholesterol
  - c) Synthesis of protein
  - d) Detoxification
14. The blood plasma is:
- a) Interstitial fluid
  - b) Extracellular fluid
  - c) Intracellular fluid
  - d) None of the above
15. The following nuclei are found in the medulla oblongata except:
- a) Respiratory center
  - b) Cardiovascular center
  - c) Pneumotaxic area
  - d) Deglutition center
16. Saltatory conduction occurs only
- a) At chemical synapses
  - b) In the initial segment of an axon
  - c) In myelinated nerve fibers
  - d) In unmyelinated nerve fibers
17. The resting membrane potential of a mammalian cell:
- a) Occurs when there is an action potential
  - b) Gives a negative voltage to the cell membrane
  - c) Is largely dependent on movement of proteins across the cell membrane
  - d) Gives a positive charge to the cell membrane

18. The following blood cell is a granulocyte?

- a) A monocyte
- b) A lymphocyte
- c) A macrophage
- d) An eosinophil

19. An inhibitory postsynaptic potential (IPSP) of the postsynaptic neuron is:

- a) A refractory period
- b) An action potential
- c) A depolarization
- d) A hyperpolarization

20. What would be the cardiac output of a person having 72 heart beats per minute and a stroke volume of 50 ml?

- a) 360 mL
- b) 3600 mL
- c) 7200 mL
- d) 5000 mL

**Section B: Short Answer Questions (30 marks)**

1. State five(5) properties of action potentials (5 marks)
2. Explain how the following factors influence the rate of diffusion of substances across the plasma membrane:
  - a) Temperature (3 marks)
  - b) Mass of the diffusing substance (3 marks)
3. State two (2) functions for each of the following cellular organelles:
  - a) Golgi complex (2 marks)
  - b) Smooth endoplasmic reticulum (2 marks)
4. Explain the ionic basis of the following phases of the cardiac action potential:
  - a) Phase 0 (2 marks)
  - b) Phase 2 (2 marks)

- 5. Describe how body water is distributed (5 marks)
- 6. State six (6) roles of proteins in the plasma membrane (6 marks)

**Section C: Long Answer Questions (20 marks)**

- 1. The heart contracts from the intrauterine life until death:
    - a) State the components of the cardiac conduction system in the order traveled by signals from the pacemaker cells (5 marks)
    - b) Describe three (3) factors that determine the stroke volume (6 marks)
    - c) Explain how the following hormones contribute to regulation of arterial pressure:
      - i. Renin-angiotensin-aldosterone system (3 marks)
      - ii. Epinephrine (3 marks)
      - iii. Antidiuretic hormone (3 marks)
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