

TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION OF DEGREE

BACHELOR OF MEDICAL LABORATORY SCIENCE (BMLS)

AMLS 4141: MEDICAL PHYSIOLOGY I

END OF SEMESTER EXAMINATION **SERIES** MAY 2016 PAPER TWO

TIME 2 HOURS

SECTION A; Attempt all questions in this section

1. As a result of mitosis, each new cell has:
 - a. Twice as many chromosomes as its parent cell
 - b. Half as many chromosomes as its parent cell
 - c. four times as many chromosomes as its parent cell
 - d. the same number of chromosomes as its parent cell
 - e. none of the above

2. Which of the following correctly lists the levels of organization from least complex to most complex?
 - a. cellular, tissue, chemical system, organ, organism
 - b. chemical, cellular, tissue, organ, system, organism

- c. tissue, cellular, chemical, organ, system, organism
 - d. chemical, tissue, cellular, system, organ, organism
 - e. organism, system, organ, tissue cellular, chemical
3. An organ is defined as a structure that has a specific structure and is composed on two or more different types of:
- a. Molecules
 - b. Cells
 - c. Systems
 - d. Tissues
 - e. Membranes
4. Which statement is not true concerning characteristics of life?
- a. All body cells exhibit irritability to some extent
 - b. Each organ system is isolated from all other body systems
 - c. Growth can be an increase in size due to an increase in the number of cells
 - d. Reproduction occurs on both the cellular and organismal level
 - e. Non of the above
5. The plasma membrane of a neuronal axon is depolarized to threshold.
- Which of the following is **not** a **direct** effect of this depolarization?
- a. closing the inactivation gates of voltage-gated Na⁺ channels

- b. release of neurotransmitter from the axon terminal
- c. initiation of an action potential
- d. opening the activation gates of voltage-gated Na^+ channels
- e. opening the activation gates of delayed rectifier K^+ channels

6. In which of the following is a transport protein most correctly matched with its function?

- a. voltage-gated Na^+ channel -- rapid depolarization phase of the action potential
- b. CFTR -- maintaining low $[\text{Ca}^{++}]$ in cytoplasm
- c. delayed rectifier K^+ channel -- primarily responsible for the resting membrane potential
- d. Na^+ /glucose co-transporter -- keeping $[\text{Na}^+]$ low in the cytoplasm
- e. Na^+ / K^+ ATPase -- repolarization phase of action potential

7. Which of the following is true?

- a. The nicotinic acetylcholine receptor is a G-protein linked receptor.
- b. ATP is hydrolyzed to cyclic AMP by phosphodiesterase.
- c. The muscarinic acetylcholine receptor is a ligand-gated channel.
- d. DAG and IP_3 are produced by the cleavage of a membrane phospholipid.
- e. Cyclic AMP is the second messenger that leads to neurotransmitter release.

8. The muscle end-plate potential is:

- a. an example of an excitatory post-synaptic potential
- b. due to ion flow through a voltage-dependent channel
- c. equal to the Nernst potential for Na^+ across the muscle cell membrane
- d. a type of action potential
- e. a hyperpolarization of the pre-synaptic membrane

9. Which of the following would most quickly and most directly lead to the depolarization of an otherwise normal, resting neuron?

- a. inhibit the Na^+ / K^+ ATPase
- b. open K^+ channels in the cell membrane
- c. add 155 mM urea to the extracellular fluid
- d. increase the activity of the Na^+ / K^+ ATPase
- e. replace most of the extracellular Na^+ with K^+

10. The role of transverse tubules in skeletal muscle fibers is to
- a.** connect the sarcomeres to each other
 - b.** binds the myofibrils
 - c.** quickly spread the action potential
 - d.** connect the sarcolemma to the sarcoplasmic reticulum (SR)
 - e.** bind to the DHP receptors
11. Voluntary skeletal muscles in the leg are innervated by:
- a.** postganglionic neurons
 - b.** somatic motor neurons
 - c.** preganglionic neurons
 - d.** CNS fibers
 - e.** all these
12. Acetylcholine is released by:
- a.** all postganglionic autonomic neurons
 - b.** preganglionic sympathetic neurons
 - C.** all postganglionic sympathetic neurons
 - D.** a and c
 - e.** all of these are true
13. Osmosis is a special case of
- a.** filtration
 - b.** active transport
 - c.** carrier transport
 - d.** diffusion
 - e.** facilitated diffusion
14. In a cell, movement of molecules from an area of low concentration to an area of high concentration
- a.** uses facilitated diffusion
 - b.** requires cellular energy
 - c.** needs associated (peripheral) proteins
 - d.** requires both cellular energy and facilitated diffusion
 - e.** uses its concentration gradient to move
15. Red blood cells would swell in which type of solution?
- a.** hypotonic

- b.** isotonic
 - c.** hypertonic
 - d.** hydrophilic
 - e.** lipophilic
16. Indicate in which compartment you would find a low concentration of both K^+ ions and Proteins
- a.** intracellular fluid
 - b.** plasma
 - c.** interstitial fluid
 - d.** extracellular fluid
 - e.** none of these
17. At the peak of an action potential, which of the following are true?
- a.** K^+ channels are closed
 - b.** the membrane = +30 mV
 - c.** Na^+ channels are open
 - d.** the membrane = +60 mV
 - e.** all of these are true
18. The speed of conduction of a nerve impulse can be determined by which of the following factors?
- 1.** temperature **2.** diameter of axon **3.** stimulus frequency **4.** myelin sheath **5.** stimulus strength
- a.** 1, 3, 5 and 4
 - b.** 1, 2 and 3
 - c.** 3 and 1
 - d.)** 3 and 2
 - e)** 4, 2 and 1
19. All of these characteristics belong to graded potentials, except for:
- a.** they have constant magnitude
 - b.** there are no refractory periods
 - c.** summation is possible
 - d.** typically occurs at the cell body of a neuron
 - e.** they are decremental
20. The type of neuron that communicates information from the central to the peripheral nervous system.
- a.** sensory neuron
 - b.** interneuron
 - c.** motor neuron
 - d.** afferent neuron
 - e.** glial cell
21. Movement of solvent and dissolved substances across a cell membrane by hydrostatic pressure is
- a.** filtration
 - b.** facilitated diffusion

- c. osmosis
 - d. simple diffusion
 - e. active transport
22. The substance acetylcholine (ACh) is released from synaptic vesicles by the process of
- a. phagocytosis
 - b. simple diffusion
 - c. passive transport
 - d. exocytosis
 - e. endocytosis
23. A reflex arch consists of which of the following
- a. Sensory neurone, afferent neurone, receptor ,synapse, motor neurone effector organ
 - b. Receptor ,afferent neurone, synapse,sensory neurone,effector organ
 - c. Receptor ,motor neurone, synapse,sensory neurone effector organ.
 - d. Receptor sensory neurone synapse afferent neurone effector organ
 - e. Receptor afferent neurone, synapse motor neurone effector organ
24. Which of the following is not true about monosynaptic reflex
- a. Consists of only one synapse within the CNS
 - b. Sensory neuron synapses directly with the motor neuron
 - c. The response is flexor muscle contraction and inhibition of extensor muscles
 - d. The Stretch Reflex is an example of monosynaptic reflex
 - e. The withdrawal reflex is not an example of monosynaptic reflex
25. Which of the following is the site of energy production in a cell
- a. Endoplasmic reticulum
 - b. Mitochondria
 - c. Plasma membrane
 - d. Ribosomes
 - e. nucleus
26. Which of the following is permanent cells of the CNS
- a. neurone
 - b. osteoblast
 - c. fibroblast
 - d. neuroblast
 - e. purkinjer cells

27. Which of the following statements about neurones is not true
- a. the basic functional unit of the nervous system
 - b. Respond to physical and chemical stimuli
 - c. Produce and conduct electrochemical impulses
 - d. Release chemical regulators
 - e. can divide by mitosis

28. Which of the following statements below is not true
- a. Lysosomes produces lytic enzymes
 - b. Mitochondria is the site of energy production
 - c. Nucleus contain the genetic information
 - d. Golgi apparatus is the site of protein synthesis
 - e. All the above

29. In Isometric muscle contraction .
- a. Muscle shorten during contraction
 - b. Occurs in smooth muscle only
 - c. used for body movements
 - d. muscle is prevented from shortening in contraction
 - e. none of the above

30. Which of the following cells secretes myelin
- a. Ependymal cells
 - b. Satellite cells
 - c. Osteocytes
 - d. fibrocytes.
 - e. oligodendrocytes

Section B

Answer all the questions

- 30. a. Describe the process by which material move across the cell membrane i.e membrane transport. (15 marks)
- 30.b. Describe the cell membrane structure. (5 marks)
- 32. Describe the process of action potential and how they are generated and propagated. (20 marks)