

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 ,affarent neurone, synapse,sensory neurone,effector organ
 - c. Receptor ,motor neurone, synapse,sensory neurone effector organ.
 - d. Receptor sensory neurone synapse affarent neurone effector organ
 - e. Receptor affarent 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)