



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
(MMUST)**

SCHOOL OF NURSING MIDWIFERY AND PARAMEDICAL SCIENCES

UNIVERSITY EXAMINATIONS 2023/2024 ACADEMIC YEAR

**FIRST YEAR FIRST TRIMESTER FOR THE DEGREE OF
BACHELOR OF SCIENCE IN NURSING
(ODEL)**

COURSE CODE: NCD 113. CLASS: JAN 2024

COURSE TITLE: HUMAN PHYSIOLOGY (cell physiology & cardiovascular system)

DATE: 9TH APRIL 2024

TIME: 8:00AM-11:00AM

INSTRUCTIONS TO CANDIDATES

All questions are compulsory

DURATION: 3 Hours

MMUST observes ZERO tolerance to examination cheating

This paper consists of 5 printed pages. Please turn over.

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQS); 20 MARKS

Choose the most appropriate answer which gives you (1 mark)

1. The maximum size of a cell is limited by
 - a) Its need for enough surface area for exchange with its environment.
 - b) The number of organelles that can be packed inside.
 - c) The materials needed to build it.
 - d) The amount of flexibility it needs to be able to move.
 - e) the amount of food it needs to survive
2. Generally accepted features of biological membrane include all of the following except
 - a) asymmetric arrangement of lipid
 - b) rapid diffusion of inorganic ions across lipid bilayer
 - c) lateral diffusion of lipid
 - d) Lateral diffusion of integral and peripheral proteins.
3. The major function /feature of the golgi apparatus in eukaryotic cells are
 - a) its carries out glycosylation of the proteins being transported
 - b) it is the major protein sorting centre of the cell
 - c) it forms secretory vesicles in its trans compartment
 - d) all of the above
4. Which one of the following organelles is enclosed by a single membrane
 - a) mitochondria
 - b) nucleus
 - c) chloroplast
 - d) lysosome
5. A distinctive features of the lysosome is that it has
 - a) a lower pH than cytoplasm
 - b) a reduced hydrolaseactivity
 - c) DNA
 - d) ribosome
6. The following are membranous cell organelles except
 - a) mitochondria
 - b) cell membrane
 - c) microtubules
 - d) lysosomes

- e) secretory vesicles
7. The organoids that can duplicate themselves are
- a) Ribosomes
 - b) Lysosomes
 - c) Mitochondria
 - d) Golgi apparatus
 - e) none of the above
8. The number of mitochondria present in a cell depends on its
- a) size
 - b) shape
 - c) energy requirements
 - d) capability of division
 - e) none of the above
9. To enter or leave a cell, substances must pass through
- a) A microtubule.
 - b) The Golgi apparatus.
 - c) A ribosome.
 - d) The nucleus.
 - e) the plasma membrane
10. In which of the following type of cells the Gap junctions are absent?
- a) Sperm cells
 - b) Brain cells
 - c) Reproductive cells
 - d) Cardiac cells
11. In which of the following type of cells Sarcoplasmic reticulum is found?
- a) muscle cells
 - b) liver cells
 - c) kidney cells
 - d) neurons
12. Which of the following are phagocytic cells?
- a) neutrophils, mast cells
 - b) mast cells, macrophages
 - c) mast cells, antibodies

- d) neutrophils, macrophages
13. Which of the following is known as the powerhouse of a cell?
- a) Mitochondria
 - b) Cytoplasm
 - c) Lysosome
 - d) Nuclei
14. Cardiac output is;
- a) the amount of blood pumped out by either auricle per unit time
 - b) the amount of blood pumped out by either ventricle per unit time
 - c) the amount of blood pumped into the auricles from vena cavae per unit time
 - d) the amount of blood pumped out of the left pulmonary artery per unit time
15. The correct sequence of levels forming the structural hierarchy is
- a) Organ, organ system, cellular, chemical, tissue, organismal
 - b) Chemical, cellular, tissue, organismal, organ, organ system
 - c) Chemical, cellular, tissue, organ, organ system, organismal
 - d) Organismal, organ system, organ, tissue, cellular, chemical
16. The largest percentage of blood is in the
- a) Lungs
 - b) Capillaries
 - c) Veins
 - d) Arteries
17. Which of the following is known as the suicide bag of a cell?
- a) Mitochondria
 - b) Golgi Complex
 - c) Lysosome
 - d) Nuclei
18. Lysosomes are produced by which of the following cell organelles?
- a) Mitochondria
 - b) Endoplasmic Reticulum
 - c) Golgi Complex
 - d) DNA

19. Which of the following cell organelle is responsible for transporting, modifying, and packaging proteins and lipids?

- a) Mitochondria
- b) Endoplasmic Reticulum
- c) Golgi Complex
- d) DNA

20. Who is the father of cell biology?

- a) George N. Papanicolaou
- b) George Emil Palade
- c) Robert Hooke
- d) None of the above

21. DNA is stored in which of the following cell organelle?

- a) Cell wall
- b) Cell Membrane
- c) Nucleus
- d) Cytoplasm

22. Who proposed the cell theory?

- a) Theodor Schwann, Watson and Robert Hooke
- b) Theodor Schwann, Matthias Schleiden and Robert Hooke
- c) Theodor Schwann, Matthias Schleiden and Rudolf Virchow
- d) NTheodor Schwann, Rudolf Virchow and Robert Hooke

23. RNA is present in which of the following cell organelles?

- a) Cell wall
- b) Ribosome
- c) Nucleus
- d) Cytoplasm
- e) Golgi complex

24. Membrane potential is present only in nerve cells.

- a) True
- b) False

25. Which of the following has the highest permeability in a resting nerve cell?

- a) Na^+
- b) Cl^-
- c) I^-
- d) K^+

26. Depolarization is when _____ ions flow inside the neuron's membrane.

- a) Potassium
- b) Sodium
- c) Chloride
- d) Magnesium

27. A neuron fires when _____

- a) action potential is achieved
- b) apoptosis is induced
- c) re-stimulation occurs
- d) stimulation ceases

28. Saltatory conduction occurs due to _____

- a) axon hillock
- b) soma
- c) myelin sheath
- d) nodes of ranvier

29. Local anesthetics act by _____ the ion channels.

- a) Inactivating
- b) Opening
- c) Closing
- d) mutating

30. Action potential can only flow in the forward direction.

- a) True
- b) False

31. The mobility of integral proteins can be measured by physical state of the _____

- a) amino acids
- b) external phospholipids
- c) membrane phospholipids
- d) membrane appendages

32. Which of the following cannot be used to mediate the fusion of plasma membranes of two different cells?

- a) electric shock
- b) inactivated viruses
- c) Polyethylene glycol
- d) emulsifier

33. The erythrocyte has a _____ shape.

- a) Spherical
- b) Convex
- c) Concave
- d) bi-concave

34. Which of the following genetic diseases is caused by mutations in a membrane protein?

- a) Alzheimer's disease
- b) Parkinson's disease
- c) Anemia
- d) Hemolytic anemia

35. Glycophorin is involved in which of the following disease?

- a) viral fever
- b) common cold
- c) Asthma
- d) malaria

36. Trans bilayer diffusion is also called _____

- a) Facilitated diffusion
- b) Lateral diffusion
- c) Flip flop
- d) Simple diffusion

37. Which of the following is an example of peripheral membrane protein?

- a) Insulin receptor
- b) Glycophorin
- c) Integrin
- d) Glycolipid transfer proteins

38. Which of the following proteins does not function in cell-cell interaction?

- a) Integrin
- b) Cadherin
- c) N-CAM
- d) Cytochrome c

39. Protein synthesis takes place in which of the following cell organelle?

- a) Cell wall
- b) Ribosome
- c) Nucleus
- d) Cytoplasm

40. Which of the following cells are found in the intestinal lining?

- a) RBCs
- b) Neurons
- c) Epithelial cells
- d) Hepatocytes

41. Which of the following is the process of synthesis of glucose?

- a) Saccharification
- b) Glycolysis
- c) Gluconeogenesis
- d) neogenesis

42. Which of the following is not a component of cell membranes?

- a) Phosphotriglycerides
- b) Cholesterol
- c) Sphingolipids
- d) Phosphodiglycerides

43. Which of the following cells release insulin when glucose levels elevate in the body?

- a) gamma cells
- b) beta cells
- c) alpha cells
- d) zeta cells

44. Which of the following cells do not usually divide but can be induced to divide?

- a) liver cells
- b) red blood cells
- c) hair cells
- d) hair follicles

45. Information is coded in the form of fast moving impulse in which types of cells?

- a) Epithelial
- b) Endothelial
- c) Neurons
- d) hepatocytes

46. An increase in the mean arterial blood pressure may result from

- a) an increase in peripheral resistance
- b) an increase in the heart rate
- c) an increase in venous return
- d) a, b and c

47. The percentages of water in each of the fluid compartments are approximately _____ intracellular fluid, _____ interstitial fluid and _____ plasma

- a) 22%, 13%, 65%
- b) 70%, 20%, 10%
- c) 65%, 22%, 13%
- d) 20%, 10%, 70%

48. The colloidal osmotic or oncotic pressure is

- a) important for controlling cell volume
- b) a key determinant for fluid movement across capillary walls
- c) largely determined by the Na^+ concentration in plasma
- d) higher in interstitial fluid than in plasma

49. If a hypotonic fluid is ingested

- a) intracellular fluid is diluted and cells swell
- b) intracellular fluid is diluted but cells stay the same size

- c) intracellular fluid is unaffected
 - d) intracellular fluid is concentrated and cells shrink
50. Most cell membranes are composed principally of
- a) DNA and ATP
 - b) proteins and lipids
 - c) chitin and starch
 - d) nucleotides and amino acids
51. Which of the following correctly matches the organelle with its function?
- a) mitochondrion — anaerobic respiration
 - b) nucleus — protein assembly
 - c) Golgi apparatus — glycosylation
 - d) lysosome — movement
52. Baroreceptors
- a) in the carotid and aortic bodies send impulses via the glossopharyngeal and vagus nerves to the medulla of the brain stem
 - b) are sensors for mean arterial blood pressure that respond to stretching of the carotid sinus and aortic arch
 - c) do not exhibit adaptation
 - d) are most sensitive between 120 and 180 mmHg
53. Which of the following statements is NOT true about ligand-gated ion channels?
- a) Neurotransmitters can act as external triggers to open ligand-gated ion channels
 - b) Ligand-gated ion channels are found in the cell membrane
 - c) Ligand-gated ion channels can be activated by cyclic AMP
 - d) Differences in membrane potential can affect whether ligand-gated ion channel receptors open or close
54. Microfilaments are composed of a protein called
- a) Tubulin
 - b) Actin
 - c) Myosin
 - d) Chitin
55. Lysosomes are known as “suicidal bags” because
- a) Parasitic activity
 - b) Presence of food vacuole

- c) Hydrolytic activity
 - d) Catalytic activity
56. A 24 year old African American man comes to the emergency room 3 hours after the onset of severe back and chest pain which started when he was climbing up a mountain. He had an episode of same symptoms five years ago. His values are Hb: 11g/dL, TLC: 12,000/mm³, Reticulocyte count: 25%. What is the diagnosis of this patient?
- a) Acute blood loss
 - b) Sickle cell anemia
 - c) Anemia of chronic disease
 - d) End stage kidney disease
 - e) Chronic blood loss
57. The resting potential membrane is determined by
- a) Potassium-ion gradient
 - b) Sodium-ion gradient
 - c) Bicarbonate-ion gradient
 - d) None
58. The oxygen and carbon dioxide crosses the plasma membrane by the process of
- a) Active diffusion
 - b) Facilitated diffusion
 - c) Passive diffusion
 - d) Random diffusion
59. Regarding binding of oxygen with hemoglobin (Hb):
- a) Oxygen loosely combines with 2 positive bonds of iron in Hb molecule
 - b) Oxygen firmly binds with 1 of the coordination bonds of iron atom
 - c) Oxygen is carried to the tissues in molecular form by Hemoglobin
 - d) Oxygen is released by Hb into the tissues in ionic form
 - e) Oxygen firmly binds with 2 positive bonds of iron in Hb molecule
60. The following facets of the internal environment of the cell must be maintained within narrow limit for optimal functioning of cell, tissue and organ in animals EXCEPT
- a. Oxygen and carbon dioxide tension
 - b. Urine concentration
 - c. Concentrations of glucose and other metabolites
 - d. Temperature

SECTION B: SHORT ANSWER QUESTIONS (SAQS); 20 MARKS

1. Outline the advantages of using light microscopes in comparison with electron microscopes?(**3marks**)
2. Explain how the structure and properties of phospholipids help to maintain the structure of cell membranes?(**6marks**)
3. Explain briefly why antibiotics are effective against bacteria but not viruses?(**5marks**)
4. State the characteristic properties of a cardiac cell? (**7marks**)

SECTION C: LONG ESSAY QUESTIONS (LEQS); 20 MARKS

1. Discuss the cell theory (**20 Marks**)