(University of Choice)

MASINDEMULIROUNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS AND NAIROBI CENRE

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

FIRST YEAR, SECOND TRIMESTER EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE IN CLINICAL MEDICINE/PHYSIOTHERAPY/HPE

COURSE CODE: HCM 103/104

COURSE TITLE: MEDICAL PHYSIOLOGY II

DATE: WEDNESDAY 20TH APRIL 2022 **TIME:** 8:00-11:00 AM

INSTRUCTIONS TO CANDIDATES

Section A: Multiple choice questions
Section B: Short Answer Questions
Sections C: Long Answer Questions

TIME: 3 Hours

Section A: Multiple choice questions **20 marks**

MCQs

1. Which of the following controls the normal breathing process
   (a) Amino acids
   (b) Cholesterol
   (c) Ventral respiratory group
   (d) Dorsal respiratory group
   (e) None of the above
2. Which of the following statement is true of pulmonary respiration?
   (a) Exchange of gases between alveoli of lungs and the blood.
   (b) Exchange of gases between blood and tissue cells
   (c) Breathing between the atmosphere and the alveoli of the lungs
   (d) Production of ATP
   (e) All of the above
3. How many oxygen molecules binds to hemoglobin to give 50% saturation
   (a) 6
   (b) 4
   (c) 2
   (d) 7
   (e) 10
4. The following are/is not functions of ECG
   a) Axis
   b) Heart rate
   c) Rhythm
   d) Blood pressure
   e) Ischemia
5. The following is/are not causes of hypoxemia
   a) Hyperventilation
   b) High altitude
   c) V/Q defects
   d) Right to left shunts
   e) Diffusion defects
6. Cardiac muscle fibers shares which property with skeletal muscle

(a) Both under somatic control

(b) Both are multinucleated

(c) Both have spindle-shaped cells

(d) Both are structured

(e) Neither has true sarcomeres

7. Which statement best describes the role of the autonomous nervous system in the regulation of the heart rate.

(a) The cardio-accelatory centre controls the activity of parasympathetic neurones to increase heart rate.

(b) Innervations of the heart by the sympathetic nervous system can increase heart rate and contraction of the heart.

(c) The cardio-inhibitory centre controls the activity of sympathetic neurones to decrease the heart rate.

(d) Acetylcholine, released by neurones that are parasympathetic nervous system, decreases heart rate

(e) B & D together

8. The main control of peripheral resistance occurs in the?

(a) Arteriole

(b) Artery

(c) Venule

(d) Capillary

(e) Vein

9. The normal pacemaker of the heart is located in the

(a) Sinoatrial node

(b) Purkinje fibers

(c) A ventricular node

(d) Wall of the left ventricle

(e) Both the left and right ventricles

10. Blood flow to a tissue will increase if the

(a) Level of oxygen at the tissues increases

(b) Veins constrict

(c) Level of CO_2 at the tissue decreases

(d) Arterioles dilate

(e) C & D

11. Which of the following combination of statements about the partial pressure of gases is correct?

    (a) $P0_2$ of air is 160 mmHg;

    PCO_2 of air is 40mmHg

    (b) $P0_2$ of the alveolus is 100mmHg

    $PC0_2$ of the alveolus is 40 mmHg

    (c) $P0_2$ of the tissues is 100 mmHg

    $PC0_2$ of vein blood is 10mmHg

    (d) $P0_2$ of the tissues is 100 mmHg

    $PC0_2$ of the tissues is 45 mmHg

    (e) $P0_2$ of venous blood is 100mmHg

    $PC0_2$ of venous blood is 20 mmHg

12. Which of the following statements on lung volume is correct.

    (a) Expiratory reserve volume is the total volume that can be expired.

    (b) Expiratory reserve volume and inspiratory reserve volume = vital capacity

    (c) Tidal volume plus inspiratory reserve volume = Maximum volume that can be inspired

    (d) Residual volume represents an emergency supply of air during periods of stress.

    (e) Residual volume represents anatomic dead space

13. Blood flow through the heart follows which of the sequences listed below?
    A. From left atrium, then mitral valve, right ventricle, aorta, left ventricle
    B. From right atrium, then mitral valve, right ventricle, pulmonary trunk, left ventricle.
    C. From pulmonary trunk, then tricuspid valve, left atrium, aortic valve, aorta
    D. From vena cava, then right ventricle, pulmonary trunk, left ventricle, aorta.
14. What feature does cardiac muscle possess that is missing in skeletal muscle?
    A. Striations
    B. Multiple Nuclei
    C. Voluntary Control
    D. Intercalated Discs
15. What is the name of the valve between the left atrium and the left ventricle?
    A. Mitral valve
    B. Tricuspid valve
    C. Semi-lunar valve
    D. Aortic valve
16. What is meant by a diastolic blood pressure of 100 mm Hg?
    A. The maximum pressure at the start of the aorta during ventricular contraction.
    B. The minimum pressure at the start of the aorta before the start of a ventricular contraction.
    C. The maximum pressure at the start of the aorta and pulmonary trunk during ventricular contraction.
    D. The minimum blood pressure measured when resting.
17. The Frank-Starling law of the heart describes the proportional relationship between which of the following pairs?
    A. Stroke volume and cardiac output
    B. Stroke volume and end-diastolic volume

C. The blood volume in the ventricles and stroke volume
D. Systemic vascular resistance and stroke volume

18. Which period of the heart cycle is completely occupied by the ventricles relaxing?
    A. Atrial systole
    B. Atrial diastole
    C. Ventricular systole
    D. Ventricular diastole
19. Choose the structure known as the pacemaker of the heart from the following.
    A. Atrio-Ventricular Node
    B. Sino-Atrial Node
    C. Atrio-Ventricular Bundle
    D. The Bundle Of His
20. The heart can be made to beat faster by which of the following?
    A. Sympathetic stimulation of the sa node
    B. Sympathetic stimulation of the av node
    C. Parasympathetic stimulation of the sa node
    D. Parasympathetic stimulation of the av node

SECTION B: **40 MARKS**

SHORT ANSWER QUESTION

1. With the help of the diagram explain the action potential within the conducting muscles of the heart. (10marks)
2. Discuss the mechanisms of ventilation (10marks)
3. Explain the mechanisms of digestion and absorption of carhohydrates. (10marks)
4. Extrapolate on lung volumes and capacities (10marks)

SECTIONS C: LONG ANSWER QUESTIONS **40MKs**

1. Discuss regulation of blood pressure mechanisms (20 marks).
2. 2(a) Explain the functions of the liver (10 marks)

   (b) Discuss mechanical cardiac cycle (10 marks)