



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of applied and health sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY (DIMBT 16S)

AAB 2112 ANIMAL ANATOMY AND PHYSIOLOGY-1

END OF SEMESTER EXAMINATION

SERIES:NOV/DEC 2016 PAPER-A

TIME:2HOURS

DATE: 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of Choose No questions. AttemptChoose instruction.

Do not write on the question paper.

QUESTION ONE

- | | |
|---|---------|
| (a) (i)State TWO functions of blood | 2 marks |
| (ii)Name TWO variety of chemical reactions performed by the cells | 2 marks |
| (b) (i) List TWO clinical disorders of erythrocytes | 2 marks |
| (ii)State TWO functions of skeletal system | 2 marks |
| (c) (i)Distinguish between arteries and veins | 2 marks |
| (d) (i) State TWO types of skeletal muscles | 2 marks |
| (ii) State the normal values of blood pressure | 2 marks |
| (e) (i) Outline the parts of human respiratory system pathway | 2 marks |
| (ii) List FOUR functions of connective tissues | 2 marks |
| (f) (i) State two functions of the skeleton | 2 marks |
| (ii)List FOUR breathing patterns | 2 marks |
| (g) Classify human bones | 4 marks |
| (h)Name TWO causes of osteoporosis | 2 marks |

QUESTION TWO

- | | |
|---|---------|
| (a)Explain the expiration process | 8 marks |
| (b)Describe characteristics of epithelial tissues | 7 marks |

Question THREE

- | | |
|---|---------|
| (a)Describe muscle contraction initiation | 7 marks |
|---|---------|

(b) Explain pulmonary circulation

8 marks

(Question FOUR

(a) Draw a well labeled diagram of a human heart

7 marks

(b) Explain the mechanism of inspiration

8 marks

Question FIVE

(a) Explain the causes of pulmonary tuberculosis

7 marks

(b) Describe the transport of proteins in a cell

8 marks

MARKING SCHEME PAPER : A

(a) -Distribution of oxygen, nutrients, metabolic wastes, and hormones

-Regulation of body temperature, pH, circulatory fluid volume

-Protection against blood loss and infection

(ii) Cells can perform a variety of chemical reactions

-Transform simple organic molecules into complex molecules (anabolism)

-Breakdown complex molecules to release energy (catabolism)

-Metabolism = all reactions performed by cells

(b) (i) Hemorrhagic - due to severe blood loss

Hemolytic – premature rupture of RBCs

Aplastic – destruction or inhibition of red bone marrow

Iron-deficient – usually due to diet

Athlete's anemia – due to vigorous exercise, temporary

Pernicious – deficient in vitamin B12 (due to insufficient intrinsic factor production)

Thalassemias – fragile RBCs

Sickle-cell – crescent-shaped RBCs

Polycythemia – Too many RBCs

(ii) it provides the shape and form, supporting, protecting, allowing bodily movement, producing [blood](#) for the body, and storing minerals.

(c)(i) **structural difference** is related to a difference in function between arteries and veins

-Arteries are much closer to the pumping action of the heart. –

-Their walls must be strong enough to take the continuous changes in pressure.

-On the other hand, veins are far from the heart in the circulatory pathway, and the pressure in them tends to be low all the time. –

-Their walls do not have to resist pressures. Because of the low pressure in the veins, and the fact that much of the blood in them flows against gravity, veins are modified to ensure that the amount of blood returning to the heart equals the amount being pumped out of the heart at any time.

-The lumens of veins tend to be much larger than those of corresponding arteries, and the larger veins have **valves** that prevent backflow of blood.

(d) (i) three types of muscles—[cardiac](#), [skeletal](#), and [smooth](#).

(ii) Normal systolic pressure is about 120 mm Hg for males, AND 110 mm Hg for females.

Normal diastolic pressure is about 80 mm Hg for males 70 mm Hg for

The pressure measured in this example is 120/80.

(e) The Pathway

-Air enters the nostrils

-passes through the nasopharynx,

-the oral pharynx

-through the glottis

-into the trachea

-into the right and left bronchi, which branches and rebranches into

-bronchioles, each of which terminates in a cluster of alveoli

(ii) Function

-Storage of energy

-Protection of organs

-Provision of structural framework for the body

-Connection of body tissues

-Connection of epithelial tissues to muscle fiber.

-Supply of hormones all over the body

-Nutritional support to epithelium

-Site of defense reactions

(f) (i) it provides the shape and form for our bodies

-in addition to supporting, protecting, allowing bodily movement, producing [blood](#) for the body, and storing minerals.

(ii) Patterns of Breathing

Apnea – temporary cessation of breathing (one or more skipped breaths)

Dyspnea – labored, gasping breathing; shortness of breath

Eupnea – Normal, relaxed, quiet breathing

Hyperpnea – increased rate and depth of breathing in response to exercise, pain, or other conditions

Hyperventilation – increased pulmonary ventilation in excess of metabolic demand

(g) long bones, short bones, flat bones, irregular bones, and sesamoid bones.

(h) When too much calcium is dissolved from bones or not enough replaced, bones lose density and are easily fractured.

-Estrogen, the female sex hormone, helps maintain proper calcium levels in bones.

- Once the ovaries stop producing the hormone, women are at higher risk of developing osteoporosis.

Question TWO

(a)-Expiration, or exhalation – a passive process that takes advantage of the recoil properties of elastic fibers

-Air is forced out of the lungs when the thoracic pressure rises above atmospheric pressure.

-The diaphragm and expiratory muscles relax.

-The elasticity of the lungs and the thoracic cage allows them to return to their normal size and shape.

-To exhale more than usual, internal (expiratory) intercostals muscles and other muscles can be stimulated.

(b) -Epithelial tissue covers surfaces with an uninterrupted layer of cells

-Epithelial cells are attached to one another.

-Intercellular spaces in epithelium are small.

- Epithelial cells are polarized.

- Epithelial cells are separated from the underlying tissue by a basement membrane.

Question THREE

muscle contraction

-In mammals, when a muscle contracts, a series of reactions occur.

-Muscle contraction is stimulated by the motor neuron sending a message to the muscles from the somatic nervous system.

-Depolarization of the motor neuron results in neurotransmitters being released from the nerve terminal.

-The space between the nerve terminal and the muscle cell is called the neuromuscular junction.

-These neurotransmitters diffuse across the synapse and bind to specific receptor sites on the cell membrane of the muscle fiber.

-When enough receptors are stimulated, an action potential is generated and the permeability of the sarcolemma is altered.

-This process is known as initiation.

(b) Pulmonary circulation

The pulmonary circulatory system is the portion of the cardiovascular system in which oxygen-depleted blood is pumped away from the heart, via the pulmonary artery, to the lungs and returned, oxygenated, to the heart via the pulmonary vein.

-Oxygen deprived blood from the superior and inferior vena cava, enters the right atrium of the heart and flows through the tricuspid valve (right atrioventricular valve) into the right ventricle, from which it is then pumped through the pulmonary semilunar valve into the pulmonary artery to the lungs.

- Gas exchange occurs in the lungs, whereby CO₂ is released from the blood, and oxygen is absorbed.

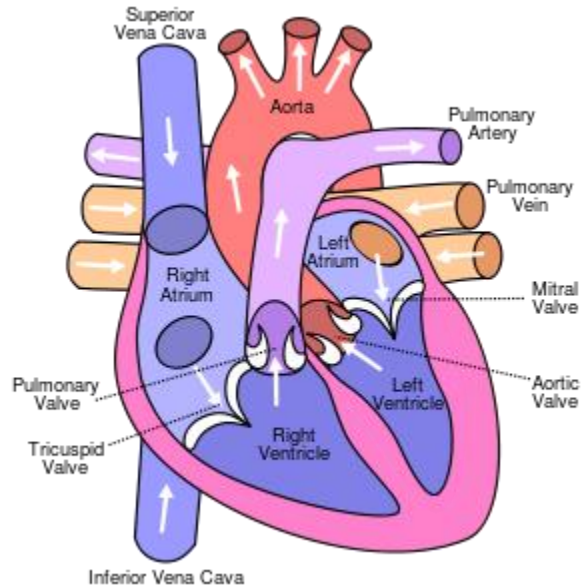
-The pulmonary vein returns the now oxygen-rich blood to the left atrium.

$Hb + O_2 \rightarrow HbO_2$

- Hemoglobin takes up oxygen and becomes oxyhemoglobin.

Question FOUR

(a)



(b) Inspiration, or inhalation – a very active process that requires input of energy

Air flows into the lungs when the thoracic pressure falls below atmospheric pressure.

The diaphragm moves downward and flattens, when stimulated by phrenic nerves.

External (inspiratory) intercostals muscles and thoracic muscles can be stimulated to contract and expand the thoracic cavity.

According to Charles' Law, the volume of a given quantity of gas is directly proportional to its absolute temperature

This means that as the inhaled air is warmed, it expands and inflates the lungs.

Question FIVE

(a) Pulmonary Tuberculosis: Past and Recent Threat

i. Caused by tubercle bacilli that invade lung tissue.

ii. Surrounding cells build up protective capsule (tubercle) that can be seen on a chest X ray.

iii. Skin test detects immunity developed due to previous exposure.

iv. Historically a serious widespread disease; controlled by antibiotics.

v. Again on rise with some strains resistant to antibiotics.

(b) Transport of Proteins - the ER, Golgi, and transport vesicles

-Ribosomes synthesize proteins

-Those destined for secretion contain a short sequence of amino acids that interact with a receptor protein on the surface of rough ER

- The ribosome interacts with the receptor protein, causing the synthesized protein to enter the ER
- The receptor protein removes the signal sequence
- Proteins that enter the ER are usually glycosylated
- The carbohydrate groups serve as chemical markers for protein distribution
- The carbohydrate groups can be modified within the ER
- In the Golgi Apparatus, proteins are segregated for transport to other regions in the cell
- The sugars attached to proteins bind to receptors in the *trans* walls of the Golgi
- These walls eventually bud off into the cytoplasm
- The vesicles then bind to the appropriate endomembrane system (ER, plasma membrane, etc) and release the contents.

Animal Anatomy and Physiology I

Contact Hours: 45

AAB 2112

Prerequisite

None

Purpose

To provide knowledge and skills in the anatomical structure of human organ systems and their physiological processes.

Objectives

By the end of the course unit, the student should be able to:

- i. Outline the structures of different body tissues and cavities and their functions;
- ii. Explain the mechanism of homeostasis and components and functions of blood; and
- iii. Describe the structure and function of nervous and musculo-skeletal systems.

COURSE DESCRIPTION

Introduction to physiology. Types of tissues and cavities: structures and functions. Homeostasis; Mechanism. Composition and functions of blood. Circulatory system: distribution of vessels in the systemic circulation, variations and abnormalities of the vascular system. Structure and functions of nervous system and sensory organs. Muscles: Types, structure, function and mechanisms of contraction. The skeletal system: Bones and cartilage. Visceral organs: liver, spleen and the appendix. Integument system: Skin and hair.

Teaching Methodology: