



“Investing in Africa’s future”

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

NSNS 324: HUMAN PHYSIOLOGY

END OF FIRST SEMESTER FINAL EXAMINATION

NOVEMBER 2020

LECTURER: Dr. J. Rukweza

DURATION: 24 HRS

INSTRUCTIONS

Answer one question out of three.

Each question carries 100 marks.

Do not repeat material.

Write legibly.

Question 1

a) One important role played by neurones is impulse transmission.

- i) Analyse the process of nerve impulse transmission. **[10]**
- ii) A 40 year old man developed an autoimmune disease which damaged the myelin sheath of peripheral nerves. Analyse how this condition would interfere with nerve impulse conduction and transmission **[10]**
- iii) Analyse the significance of the blood brain barrier. **[10]**

b) The digestive system is imperative for health status of the body.

- i) Discuss the two main processes involved in digestion of food. **[10]**
- ii) With reference to its anatomic structure, describe the role of the small intestine. **[10]**
- iii) Analyse the role of three accessory organs of the digestive system. **[10]**

c) The lymphatic system is closely tied to the immune system.

- i) Describe the functions of the lymphatic system. **[5]**
- ii) Identify key lymphocytes and outline their significance in body defence mechanism. **[10]**
- iii) With reference to two examples, narrate the effects of a low white cell count on a 4 year old child. **[5]**

d) The cell is a fundamental functional unit of the human body.

- i) Considering its delicate structure, outline the functions of the cell membrane. **[5]**
- ii) Describe the role of the microtubules and mitochondria in the cell. **[10]**
- iii) Cell respiration begins with glycolysis. Describe this process, highlighting its products. **[5]**

Question 2

a) The cardiovascular system is of the body's major systems responsible for transportation throughout the body

- i) Outline the auto rhythmic nature of the heart in the initiation and conduction of an action potential. **[5]**
- ii) Considering the major function of the cardiovascular system explain the challenges that could occur should the system fails to operate effectively. **[10]**
- iii) The cardiac muscle relies solely on calcium influx for an effective contraction of the myocardium. With reference to two sources of calcium explain the role of calcium in myocardium contraction **[10]**
- iv) There are parameters that are critical in the flow of blood in the vessels. Give an explanation on how three of the parameters influence resistance to blood flow. **[5]**

b) The endocrine system is critical in maintaining homeostasis and ensuring proper body maintenance.

- i) Analyse the release and significance of the growth hormone and anti-diuretic hormone. **[10]**
- ii) Of all the major endocrine organs, explain why the hypothalamus is the "master gland". **[10]**
- iii) Explain the role played by the hormones released by the adrenal gland. **[5]**
- iv) Describe the regulation of insulin release. **[5]**

c) At least one kidney must function effectively for proper body maintenance.

- i) Identify five important roles of the kidneys. **[5]**
- ii) Describe the formation of urine. **[10]**
- iii) The kidneys have an important endocrine function known as the Renin-angiotensin-aldosterone system. Describe this system. **[5]**
- d) The intact skin is very important in providing a physical barrier, which prevents invasion of body by pathogens.
 - i) Analyse the characteristics of the skin that enables it to provide the important role. **[10]**
 - ii) Following a successful invasion of skin by pathogen, an inflammatory response is often triggered, which prevents spread of the infection. Describe the process of inflammatory response that normally occurs. **[10]**

Question 3

- a) The reproductive system functions to produce gametes and reproductive hormones required for procreation.
 - i) Describe the hormonal control of male reproductive function. **[5]**
 - ii) Testosterone levels normally remain stable. Analyse how the negative feedback mechanism maintains the levels within the normal levels. **[5]**
 - iii) Describe the major events in the menstrual cycle. **[8]**
 - iv) Outline events which occur during an ovarian cycle. **[7]**
- b) Lung volumes are determined by interaction of lungs and chest wall, with changes in the volumes indicating presence of lung disease.
 - i) With reference to four major lung volumes, describe the significance of assessment of these. **[10]**
 - ii) Lung compliance is important when considering lung volumes. With reference to a definition of lung compliance, analyse its determinants. **[5]**
 - iii) The depth and rate of breathing is under control by numerous elements. Discuss the various elements regulating breathing. **[15]**
 - iv) Analyse the role of the respiratory system in the regulation of the acid base balance. **[5]**
- c) The muscle system is important in producing body movement and maintenance of body posture.
 - i) With reference to three well defined types, describe the general properties of the muscles of the body. **[7]**
 - ii) Analyse the general structure of the skeletal muscle cells, which give it its typical structure and function. **[5]**
 - iii) Describe the processes involved in muscle cell contraction. **[8]**
- d) In the body defence system there are a number of major organs and tissues playing a critical role.
 - i) Identify two primary lymphatic organs and highlights their significance. **[5]**
 - ii) Analyse the critical role the mucus membrane plays in body defence. **[5]**
 - iii) The immune response operate with two important major process. Giving four classes of immune molecules, describe the antibody mediated immunity. **[10]**