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**MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**(MMUST)**

**SCHOOL OF NURSING MIDWIFERY AND PARAMEDICAL SCIENCES**

**FIRST YEAR SECOND TRIMESTER FOR THE DEGREE OF BACHELOR OF SCIENCE  
IN NURSING**

**SPECIAL/SUPPLEMENTARY EXAM**

**DEPARTMENT: CLINICAL NURSING AND HEALTH INFORMATICS**

**PROGRAMME: ODEL UPGRADER**

**COURSE CODE: NCD 122**

**COURSE TITLE: MEDICAL PHYSIOLOGY III: (resp/endocrine)**

**YEAR OF STUDY: 2020/2021**

**ACADEMIC YEAR: 1<sup>ST</sup>**

**TRIMESTER: TWO**

**DATE: THURSDAY 13<sup>TH</sup> APRIL**

**TIME .11: 30AM-2:30PM**

**INSTRUCTIONS TO CANDIDATES**

**All questions are compulsory**

**DURATION: 3 Hours**

**MMUST observes ZERO tolerance to examination cheating**

**This paper consists of 5 (Five) printed pages. Please turn over.**

**SECTION A: MULTIPLE CHOICE QUESTIONS (20MARKS)**

1. Regarding airway resistance

- a) The Poiseuille equation denotes pressure volume characteristics for turbulent flow
  - b) The very small bronchioles are the major site of resistance to airflow
  - c) Decreased pCO<sub>2</sub> in alveolar gas causes an increase in airway resistance
  - d) As lung volume reduces, airway resistance reduces also
  - e) Contraction of bronchial smooth muscle by stimulation of adrenergic receptors increases airway resistance
2. Regarding control of ventilation
- a) The apneustic center lies in the medulla
  - b) The central chemoreceptors respond to changes in oxygen concentrations
  - c) The chemoreceptors in the aortic bodies respond to a fall in arterial pH
  - d) Peripheral chemoreceptors respond to decreases in arterial pO<sub>2</sub>
  - e) The most important factor in control of ventilation under normal conditions is the pO<sub>2</sub> of the arterial blood
3. The inhibition of Antidiuretic hormone (ADH), say by alcohol, would have what affect?
- a) constriction of afferent arteriole
  - b) inhibition of diuresis
  - c) stimulation of water conservation
  - d) constriction of efferent arteriole
  - e) reduction in water conservation by kidneys
4. The region in the brain that sets the limit for over-inflation of lungs is located in the
- a) pons
  - b) apneustic center
  - c) arterial blood chemistry
  - d) medulla oblongata
5. Given:  $\text{CO}_2 + \text{H}_2\text{O} \leftrightarrow \text{H}_2\text{CO}_3 \leftrightarrow \text{H}^+ + \text{HCO}_3^-$ , what happens if there is an increase in H ions?
- a) More carbon monoxide produced
  - b) more bicarbonate ions produced
  - c) an increase in protons
  - d) there would be a shift to the right first, then to the left
  - e) there would be a shift to the left
6. For air to leave the lungs during inspiration, the pressure inside the lungs must become
- a) higher than atmospheric pressure
  - b) lower than atmospheric pressure
  - c) equal to the atmospheric pressure
  - d) diaphragm must contract
7. In emphysema, a distinguishing characteristic compared to other COPD's is
- a) bronchiole dilation
  - b) bronchiole constriction
  - c) inflammation of the bronchioles
  - d) destruction of alveolar macrophages

d) Determine last oral intake.

15. Oxygen supply to the body is determined by:

- a) Cardiac output
- b) Hemoglobin concentration
- c) Oxygen saturation
- d) A, B, and C

16. At high altitudes all of the following things occur in an effort to acclimatise EXCEPT

- a) Hypoventilation
- b) Polycythaemia
- c) Increased numbers of capillaries per unit volume in peripheral tissues
- d) O<sub>2</sub> dissociation curve shifts to right
- e) Pulmonary vasoconstriction

17. With respect to regional gas exchange in the upright lung

- a) Ventilation is greater at the top of the lungs
- b) Perfusion is much greater at the top of the lungs compared with the bases
- c) Ventilation/perfusion ratio is abnormally high at the top of the lungs
- d) PO<sub>2</sub> is highest at the bases of the lungs
- e) PH is highest at the bases of the lungs

18. Regarding oxygen transport

- a) The predominant way oxygen is transported in the blood is as dissolved oxygen
- b) 1 gram of pure Hb can combine with 1.34 - 1.39 ml of oxygen
- c) An anaemic patient has a lowered arterial pO<sub>2</sub> because the Hb is low
- d) CO<sub>2</sub> is 200 times more soluble than oxygen

19. The primary chemical stimulus for breathing is the concentration of

- a) carbon monoxide in the blood
- b) carbon dioxide in the blood
- c) oxygen in the blood
- d) carbonic acid in the blood

20. Aldosterone secretion is increased when there is a fall in \_\_\_\_\_?

- a) pH of the plasma
- b) Plasma Na<sup>+</sup>
- c) Plasma K<sup>+</sup>
- d) Angiotensin II level

- d) destruction of alveolar macrophages
- e) destruction of elastic lung tissues

8. Low calcium level will cause \_\_\_\_\_?

- a) Weak heart action
- b) Hyper excitability of wrist muscle
- c) Tetanus
- d) All of the above

9. Water molecules on the surface of the alveoli generate surface tension; this force

- a) inhibits alveolar collapse
- b) assists compliance
- c) resists elastic recoil
- d) assists elastic recoil

10. Six hours following a traumatic brain injury due to a fall from a ladder, Mr. Plueth develops Hypotension and a 4 gram drop in hemoglobin. Which one of the following problems would be Consistent with these findings?

- a) Diabetes insipidus
- b) Intracranial hemorrhage
- c) Intra-abdominal bleeding
- d) Fat embolism

11. Acetylcholine is released by:

- a) All postganglionic autonomic neurons
- b) preganglionic sympathetic neurons
- c) all postganglionic sympathetic neurons
- d) a and c

12. During internal and external respiration, gases move by

- a) osmosis
- b) active transport
- c) diffusion
- d) endocytosis

13. Most oxygen in the blood is transported

- a) as gas dissolved in plasma
- b) as oxyhemoglobin
- c) as carboxyhemoglobin
- d) as bicarbonate

14. In a patient with suspected mild hypoglycemia, what is the first intervention the critical care nurse should implement?

- a) Give intravenous glucose STAT.
- b) Obtain blood glucose level.
- c) Determine last insulin dose and time administered.

**SECTION B: SHORT ANSWER QUESTIONS 40 marks)**

1. State three function of surfactant factor in the lung?(6marks)
2. What is pulmonary compliance? (2marks)
3. State the systemic effect of low insulin levels(hypoglycemia) in the human body (4marks)
4. State four factors that influence pulmonary compliance? (8marks)
5. With two courses, state what is V/Q inequality on gas exchange? (8marks)
6. State the process in which vasopressin (ADH) cause retention of water in the body? (6marks)
7. State at least four sites of the brain that participate in the respiratory control mechanism? (6marks)

**SECTION C: LONG ANSWER QUESTION 40 MARKS**

1. Mrs. Kamau was admitted two days ago following emergency explorative laparotomy, but has failed a spontaneous breathing trial. On chest x-ray, his lungs are hyperinflated with interstitial disease and chest appears barrel shaped.

- a) Describe a normal arterial blood gas (BGA)? (5mrks)
- b) With the aid of a diagram describe the physiology of breathing?(5mrks)
- c) Explain the immediate care of Mrs. Kamau? (10mrks)

2. Mr. Smith is admitted with pulmonary edema requiring intubation. His cardiac troponin and CK increase 5 fold, 2 hours after admission and he develops ST segment depression in his lateral leads. He has a history of diabetes, COPD and renal insufficiency.

- a. Discuss the renal system as a buffer in respiratory acidosis?(5mrks)
- b. Describe the effects of Atrial Naturetic Peptide in response to fluid overload?(5mrks)
- c. Discuss hormonal control of respiration(10mrks)

