



**MAASAI MARA
UNIVERSITY**

**REGULAR UNIVERSITY
EXAMINATIONS
2018/2019 ACADEMIC YEAR
FIRST YEAR SECOND SEMESTER**

**FIRST YEAR EXAMINATION FOR
DEGREE BACHELOER OF SCIENCE IN
NURSING (BScN)**

**COURSE CODE: NUR 1203
COURSE TITLE: PHYSIOLOGY OF BLOOD,
CARDIOVASCULAR,
RESPIRATORY, RENAL,
REPRODUCTIVE AND
NEUROPHYSIOLOGY**

**DATE: 17TH APRIL, 2019
1130HRS**

TIME: 0830 -

INSTRUCTIONS:

- i. This end of year examination consists of 3 (Three) sections. Namely, Section A, B and C.

- ii. Section A, is of Multiple Choice Questions (MCQs). There are Forty (40) questions and/or statements, each with given responses underneath; i.e. a, b, c, d and/or e. On the answer sheet provided, **CIRCLE THE SINGLE BEST RESPONSE OUT OF THOSE PROVIDED**
 - One mark is awarded for every correct response
 - Wrong response or omitted responses will NOT be penalized
- iii. Section B is of Short Answer Questions (SAQs). There are Eighty (8) questions. Answer all questions on the spaces provided in the Question paper.
- iv. Section C is of Long Answer Questions (LAQ, ESSAY). Answer one question from this section on the separate answer booklet provided.
- v. Write your registration number and NOT your name on all the pages of this Question booklet and the LAQ answer booklet.

SECTION A - (40 MARKS)

1. What occurs following activation of basophils?
 - a) Decreased diapedesis of neutrophils
 - b) Decreased amoeboid motion
 - c) Contraction of blood vessels
 - d) Increased capillary permeability
2. Fluid exudation into the tissue in the acute inflammatory reaction is due to
 - a) decreased blood pressure
 - b) decreased protein in the interstitium
 - c) obstruction of the lymph vessels
 - d) increased vascular permeability
3. Which of the following applies to AIDS patients?
 - a) Able to generate a normal antibody response
 - b) Increased helper T cells
 - c) Increased secretion of interleukins
 - d) Decrease in helper T cells
4. Which of the following transfusions will result in an immediate transfusion reaction?
 - a) Rh⁻ whole blood to an O Rh⁺ patient
 - b) A Rh⁻ whole blood to a B Rh⁻ patient
 - c) AB Rh⁻ whole blood to an AB Rh⁺ patient
 - d) B Rh⁻ whole blood to an B Rh⁻ patient
5. Which of the following is a TRUE statement?
 - a) In a transfusion reaction, there is agglutination of the recipient blood
 - b) Shutdown of the kidneys following a transfusion reaction occurs slowly
 - c) Blood transfusion of Rh⁺ blood into any Rh⁻ recipient will result in an immediate transfusion reaction
 - d) A person with type AB blood is considered to be a universal recipient

- 6.** A 21-year-old female, blood type B, is undergoing surgery. Her platelet count is 75,000/ μ l. She will need platelet infusions before and during surgery. Which of the following blood types would be used to collect platelets that are compatible with the patient?
- Type B only
 - Type O only
 - Types B and O
 - Types A and B
- 7.** Which of the following is TRUE concerning erythroblastosis fetalis (hemolytic disease of the newborn, HDN)?
- This occurs when a Rh⁺ mother has an Rh⁻ child
 - This is prevented by giving the mother a blood transfusion
 - A complete blood transfusion after the first birth will prevent HDN
 - The father of the child has to be Rh⁺
- 8.** The coagulation pathway that begins with tissue thromboplastin is
- extrinsic pathway
 - intrinsic pathway
 - common pathway
 - fibrin stabilization
- 9.** Which of the following statements is true about capillaries?
- Contains 5% of total blood volume
 - Contain 10% of total blood volume
 - Velocity of blood flow is maximum
 - Offer maximum resistance to blood flow
- 10.** Which of the following statements regarding the flow of lymph from lower limb is true?
- Increased with change from supine to standing position
 - Decreased in increased capillary permeability
 - Decreased in deep vein valve incompetence
 - Increased by massage of foot
- 11.** Which of the following would best explain a prolonged bleeding time test?
- Hemophiliac A
 - Hemophilia B
 - Thrombocytopenia
 - Coumarin use
- 12.** Why do some malnourished patients bleed excessively when injured?
- Vitamin K deficiency

- b) Platelet sequestration by fatty liver
 - c) Serum bilirubin raises neutralizing thrombin
 - d) Low serum-protein levels cause factor XIII problems
- 13.** Excitation of the ventricles
- a) Always leads to excitation of the atria
 - b) Results from the action of norepinephrine on ventricular myocytes
 - c) Proceeds from the subendocardium to subepicardium
 - d) Is initiated during the plateau (phase 2) of the ventricular action potential
- 14.** AV nodal cells
- a) Exhibit action potentials characterized by rapid depolarization (phase 0)
 - b) Exhibit increased conduction velocity when exposed to acetylcholine
 - c) Conduct impulses more slowly than either atrial or ventricular cells
 - d) Are capable of pacemaker activity at an intrinsic rate of 100 beats/min.
- 15.** Stimulation of the parasympathetic nerves to the normal heart can lead to complete inhibition of the SA node for several seconds. During that period
- a) P waves would become larger
 - b) There would be fewer T waves than QRS complexes
 - c) There would be fewer P waves than T waves
 - d) There would be fewer QRS complexes than P waves
- 16.** The ST segment of the normal ECG
- a) Occurs during a period when both ventricles are completely repolarized
 - b) Occurs when the major dipole is directed from subendocardium to subepicardium
 - c) Occurs during a period when both ventricles are completely depolarized
 - d) Is absent in lead I of the ECG
- 17.** During the cardiac cycle,
- a) The second heart sound is associated with opening of the aortic valve
 - b) Left atrial pressure is always less than left ventricular pressure
 - c) Aortic pressure reaches its lowest value during ventricular systole
 - d) The ventricles eject blood during all of systole

- 18.** Which of the following would cause a decrease in stroke volume, compared with the normal resting value?
- Reduction in afterload
 - An increase in end-diastolic pressure
 - Stimulation of the vagus nerves
 - Electrical pacing to a heart rate of 200 beats/min
- 19.** Mean arterial pressure equals
- Arterial compliance times stroke volume
 - Heart rate times stroke volume
 - Cardiac output times systemic vascular resistance
 - Cardiac output times arterial compliance
- 20.** Mean arterial pressure changes if
- Heart rate increases, with no changes in cardiac output or systemic vascular resistance
 - Stroke volume changes, with no changes in heart rate or systemic vascular resistance
 - Arterial compliance changes, with no changes in cardiac output or systemic vascular resistance
 - Heart rate doubles and systemic vascular resistance is halved, with no change in stroke volume
- 21.** In the systemic circulation, vascular resistance
- Changes occur mainly in the aorta and large arteries
 - Is altered more by changes in blood viscosity than radius
 - Is altered more by changes in vessel radius than length
 - Is altered more by changes in vessel length than radius
- 22.** Standing up causes
- Decreased diameter of leg veins
 - Decreased blood volume within the cranium
 - Increased stroke volume
 - Decreased central blood volume
- 23.** If a person has an arterial blood pressure of 125/75 mm Hg,
- The pulse pressure is 40 mm Hg
 - The mean arterial pressure is 92 mm Hg
 - Diastolic pressure is 80 mm Hg
 - Systolic pressure is 120 mm Hg
- 24.** "Voluntary" movements are produced by
- The simultaneous activation of both α and γ motoneurons.
 - Impulses traveling via "upper" motoneurons directly from the brain to muscle extrafusal fibers.
 - Direct activation of the γ loop and reflex activation of α motoneurons.

- d)** Direct activation of α motoneurons with little or no response of γ motoneurons.
- 25.** Postural tone in antigravity muscles depends *most* upon sustained activity of
- a)** Cerebellar Purkinje cells.
 - b)** Neurons of the reticulospinal tracts.
 - c)** Neurons of the vestibulospinal tracts.
 - d)** Neurons in the red nucleus.
- 26.** Which of the following characterizes lower motoneuron disease?
- a)** Exaggerated reflexes
 - b)** Enhanced recurrent activation of Renshaw cells
 - c)** Being a later stage from the development of upper motoneuron disease
 - d)** Atrophy of the affected muscles
- 27.** The alpha rhythm of the electroencephalogram (EEG)
- a)** Results from cortical desynchronization during mental excitation.
 - b)** Is in the frequency range of 4 to 7 Hz, seen in drowsy states.
 - c)** Is indicative of cortical hypoxia.
 - d)** Is prominent during supine relaxation with eyes closed.
- 28.** Rapid eye movement (REM) sleep is characterized
- a)** By an EEG pattern of low-amplitude desynchronized activity.
 - b)** By a cortical EEG pattern of delta range (2–4 Hz) activity.
 - c)** By a significant increase in muscle tone.
 - d)** As paradoxical because it occurs only once during the night, whereas other sleep stages occur several times.
- 29.** The function of the neocerebellum is:
- a) Maintenance of equilibrium
 - b) Servo-correction of voluntary movements
 - c) Planning and programming of voluntary movements
 - d) Maintenance of muscle tone
- 30.** Neurotransmitter involved in nigrostriatal pathway is:
- a) Serotonin
 - b) Dopamine
 - c) Cholinergic
 - d) Adrenergic
- 31.** In the transport of CO₂ from the tissues to the lungs, which of the following occurs in venous blood?

- a) Conversion of CO_2 and H_2O to H^+ and HCO_3^- in the red blood cells (RBCs)
 - b) Buffering of H^+ by oxyhemoglobin
 - c) Shifting of HCO_3^- into the RBCs from plasma in exchange for Cl^-
 - d) Binding of HCO_3^- to hemoglobin
- 32.** The pH of venous blood is only slightly more acidic than the pH of arterial blood because
- a) CO_2 is a weak base
 - b) there is no carbonic anhydrase in venous blood
 - c) the H^+ generated from CO_2 and H_2O is buffered by HCO_3^- in venous blood
 - d) the H^+ generated from CO_2 and H_2O is buffered by deoxyhemoglobin in venous blood
- 33.** In a premature infant without pulmonary surfactant,
- a) Surface tension of alveoli is less than normal.
 - b) A greater than normal pressure difference between the inside and outside of the lungs is required for lung inflation.
 - c) Large alveoli collapse more easily than small alveoli.
 - d) Pressures due to surface tension in large and small alveoli are equal.
- 34.** Physiological dead space volume is unchanged by
- a) Increases in volume of the alveolar dead space.
 - b) Widening of the airways above the respiratory zone.
 - c) Increases in breathing frequency.
 - d) Increases in volume of the anatomical dead space.
- 35.** Which of the following stimulates activity in central chemoreceptors?
- a) Decreased partial pressure of oxygen (PO_2)
 - b) Increased PaO_2
 - c) Normal A-a PO_2
 - d) Increased partial pressure of carbon dioxide (PCO_2)
- 36.** Secretion of K^+ by the distal tubule will be decreased by
- a) metabolic alkalosis
 - b) a high- K^+ diet
 - c) hyperaldosteronism
 - d) spironolactone administration
- 37.** Subjects A and B are 70-kg men. Subject A drinks 2 L of distilled water, and subject B drinks 2 L of isotonic NaCl. As a result of these ingestions, subject B will have a
- a) greater change in intracellular fluid (ICF) volume

- b) higher positive free-water clearance (CH_2O)
- c) greater change in plasma osmolarity
- d) higher urine osmolarity

38. Use the values below to answer the following question.

Glomerular capillary hydrostatic pressure = 47 mm Hg

Bowman's space hydrostatic pressure = 10 mm Hg

Bowman's space oncotic pressure = 0 mm Hg

At what value of glomerular capillary oncotic pressure would glomerular filtration stop?

- a) 57 mm Hg
- b) 47 mm Hg
- c) 37 mm Hg
- d) 10 mm Hg

39. The reabsorption of filtered HCO_3^-

- a) results in reabsorption of less than 50% of the filtered load when the plasma concentration of HCO_3^- is 24 mEq/L
- b) acidifies tubular fluid to a pH of 4.4
- c) is directly linked to excretion of H^+ as NH_4^+
- d) is inhibited by decreases in arterial PCO_2

40. To maintain normal H^+ balance, total daily excretion of H^+ should equal the daily

- a) fixed acid production plus fixed acid ingestion
- b) HCO_3^- excretion
- c) HCO_3^- filtered load
- d) titratable acid excretion

SECTION B. - Answer All Questions (5 Marks Each)

1. State five (5) differences between fast pain and slow pain (5 marks)

2. Describe the areas of the brain that involve memory and learning.

(5 marks)

3. Describe how arginine vasopressin and thirst regulate water balance

(5 marks)

4. Describe the renal handling of bicarbonate ions (HCO_3^-) (5 marks)

5. Describe the interrelationships between Bohr effect and Haldane effect (5 marks)
6. Explain why is respiration not stimulated in anaemia (5 marks)
7. State and explain the physiology of the waves and intervals of the normal ECG (5 marks)
8. State five (5) functions of plasma proteins (5 marks)

SECTION C. - LONG ANSWER QUESTION - (Select ONE and answer) ESSAY (20 marks)

1. Discuss the control of posture and movement by the brain under the following headings:
 - a) Cerebral cortex (7 Marks)
 - b) Cerebellum (7 Marks)
 - c) Basal ganglia (6 Marks)
2. Discuss the control of respiration in the human body under the following headings (20 marks):
 - a) Define respiration (2 Marks)
 - b) Nervous control of respiration (10 Marks)
 - c) Chemical control of respiration (6 Marks)
 - d) Voluntary control (2 Marks)
3. Discuss the regulation of blood pressure (BP) under the following headings: (20 marks)
 - a) Short-term control (8 Marks)
 - b) Long-term and hormonal control (12 Marks)
4. Discuss the renal regulation of Sodium (Na^+) excretion in the human body (20 marks)

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