

University of Mosul  
College of Veterinary Medicine  
Department: Physiology, Biochemistry  
& Pharmacology



Competitive examination / M.Sc. in  
veterinary physiology

Time: 3 Hours

Lecture:

Date: / / 2024



**Answer all the questions**

**Q1. Choose the correct answer from the following:**

**(70 marks)**

**1- The resting membrane potential of a neuron**

- (A) Is depolarized.
- (B) Has excess anions (negative charge) on the outside the cell membrane.
- (C) Is more permeable to potassium ions than to sodium ions.
- (D) Is more permeable to sodium ions than to potassium ions.

**2- The spike potential of the neural action potential is due to**

- (A) The opening of voltage – gated  $Ca^{2+}$  channels.
- (B) The opening of voltage – gated  $K^+$  channels.
- (C) The opening of voltage – gated  $Na^+$  channels.
- (D) The opening of voltage – gated  $Cl^-$  channels.

**3- The action potential is said to obey the all or none law because**

- (A) Any stimulus of threshold intensity produces action potential and sub threshold stimulus fails to produce action potential.
- (B) Increase stimulus produce increment in action potential.
- (C) Sub threshold stimulus produce action potential.
- (D) Any stimulus of threshold intensity fails produces action potential.

**4- Saltatory conduction**

- (A) Occurs in unmyelinated nerve fibers.
- (B) Is slower than conduction by local current flow because the myelin acts as an insulator to slow the impulse down.
- (C) Involves the impulse jumping from one node of Ranvier to the adjacent node.
- (D) Refers to the action potential spreading from dendrite to the adjacent dendrite.

**5- When the action potential reaches the presynaptic terminal, which of the following channel is opened?**

- (A) Voltage gated  $Na^+$  channel.
- (B) Voltage gated  $K^+$  channel.
- (C) Voltage gated  $Cl^-$  channel.
- (D) Voltage gated  $Ca^{+2}$  channel.

**6- Which of the following about excitatory postsynaptic potential (EPSP) is correct?**

- (A) Opening of  $Cl$  channels and  $Cl$  ion influx and increased efflux of  $K$  ions.
- (B) increased efflux of  $K$  ions.
- (C) Opening of  $Na$  channels and closing  $K$  channels.
- (D) Opening of  $Ca$  channels.

7- The acetylcholine receptors in the motor end-plates of skeletal muscle are called

- (A) Beta receptor. (B) Nicotinic receptor.  
(C) Alpha receptor. (D) Muscarinic receptors.

8- Which of the followings has calcium storage sacs?

- (A) Transverse system (T system). (B) Sarcoplasmic reticulum.  
(C) Sarcolemma. (D) Sarcoplasm.

9- What is the name of the mechanism by which the action potential generated in muscle fiber that stimulate skeletal muscle to contract

- (A) Generation of end plate potential. (B) Generation of end plate contraction.  
(C) Inhibition contraction coupling. (D) Inhibition of end plate potential.

10- At the motor end plate of skeletal muscle, acetylcholine (ACh) causes opening of

- (A)  $\text{Na}^+$  and  $\text{K}^+$  channels and depolarization. (B)  $\text{Na}^+$  channels and depolarization.  
(C)  $\text{Ca}^{2+}$  channels and depolarization. (D)  $\text{K}^+$  channels and depolarization.

11- Sympathetic postganglionic neurons that innervate skeletal blood vessels caused vasodilation by

- (A) Dopamine secretion. (B) Serotonin secretion.  
(C) Adrenaline secretion. (D) Acetylcholine secretion.

12-When directing light to the eyes, the pupillary opening become

- (A) Miosis. (B) No change in diameter. (C) Mydriasis. (D) Decrease in diameter.

13-Increased rate of blood coagulation when stimulated by

- (A) Sympathetic nervous system. (B) Parasympathetic nervous system.  
(C) Somatic nervous system. (D) Enteric nervous system.

14- Optic disc in retina

- (A) Is the area entirely composed of cones. (B) Is the area entirely composed rods.  
(C) Is the area from which optic nerve leaves the eye ball. (D) Has no blood vessel and nerve.

15- QRS complex is due to

- (A) Ventricular repolarization. (B) Ventricular depolarization.  
(C) Atrial depolarization. (D) Atrial repolarization

16- The atrio-ventricular valves

- (A) Have three cusps for each valve.  
(B) Their closure is initiated when the ventricular pressure exceeds atrial pressure .  
(C) Open by contraction of papillary muscles.  
(D) Their closure is initiated when the atrial pressure exceeds ventricular pressure.



**17- Cardiac output is equal to:**

- (A) Stroke Volume (SV)  $\times$  Venous Return (VR).
- (B) End Diastolic Volume (EDV) – End Systolic Volume (ESV).
- (C) Stroke Volume (SV)  $\times$  Heart Rate (HR).
- (D) Cardiac Index.

**18- Purkinje system is to**

- (A) Prevent premature ventricular beats.
- (B) Coordinate the valve movements with myocardial contraction.
- (C) Enable all parts of the ventricle to contract simultaneously.
- (D) Delay the systole until the ventricles fill.

**19- Decrease oxygen availability to tissues causes**

- (A) Vascular muscle contraction.
- (B) Decrease in respiratory rate.
- (C) Increase synthesis of ATP.
- (D) Local vasodilation.

**20- The first heart sound (HS1) occurs due to closure of AV valves during**

- (A) Isotonic ventricular relaxation.
- (B) Isotonic ventricular contraction.
- (C) Isovolumetric ventricular contraction.
- (D) Isovolumetric ventricular relaxation.

**21- In a normal ECG**

- (A) The P wave indicates the condition of the conductive system.
- (B) The P wave represents depolarization of atrial myocardium.
- (C) QRS complex is mainly negative due to spread of depolarization down.
- (D) QRS is due to depolarization in the ventricular septum.

**22- Baroreceptors located in the carotid sinus and aortic arch and sense to**

- (A) Changes in  $O_2$  and  $CO_2$  blood levels.
- (B) Changes in  $Ca^{++}$  blood levels.
- (C) Changes in arterial pressure.
- (D) Chemical and mechanical changes.

**23- How does angiotensin II raise blood pressure?**

- (A) Decreasing sodium reabsorption in the kidney.
- (B) Causing vasodilation.
- (C) Decrease vasopressin secretion.
- (D) Directly by increasing vasoconstriction and indirectly by stimulating aldosterone release.

**24- One of the most important functions of surfactant agent is**

- (A) Helps to prevent chest collapse.
- (B) Helps to prevent trachea collapse.
- (C) Helps to prevent alveolar collapse.
- (D) Helps to prevent abdominal collapse.

**25- Between what the internal respiration happens during respiratory process?**

- (A) The lung and cells.
- (B) The lung and alveolar fluid.
- (C) The cells and their fluid medium.
- (D) Blood and lung.

26- If the IRV=150ml/mint and TV= 500ml/mint how much the Inspiratory capacity?

- (A) 750 ml/mint. (B) 650 ml/mint.  
(C) 850 ml/mint. (D) 950 ml/mint.

27- Surfactant is a phospholipid agent synthesized by

- (A) Lymphocytes. (B) Plasma cell.  
(C) Type II alveolar epithelial cell. (D) Mast cell.

28- Which of the following statements is correct?

- (A) Pulmonary ventilation= Vital capacity  $\times$  Respiratory rate.  
(B) Pulmonary ventilation= Residual volume  $\times$  Respiratory rate.  
(C) Pulmonary ventilation= Tidal volume  $\times$  Respiratory rate.  
(D) Pulmonary ventilation= Inspiratory capacity  $\times$  Respiratory rate.

29- What is the function of pneumotaxic center?

- (A) Elevate pressure. (B) Reduce gas exchange.  
(C) Increase expiration. (D) Inhibition of inspiration.

30- Which one of the respiratory volumes is associated with the maximal volume of air that can be inspired from the end tidal inspiration.

- (A) Inspiratory reserve volume. (B) Tidal volume.  
(C) Residual volume. (D) Expiratory reserve volume

31- If ERV = 150 ml/minute, IRV= 50 ml/minute and TV= 100 ml/minute, how much the functional residual capacity?

- (A) 350 ml/minute. (B) 300 ml/minute. (C) 250 ml/minute. (D) 150 ml/minute.

32- Which type of gas can diffuses across the blood-brain barrier from blood to cerebral spinal fluid with easy?

- (A) CO<sub>2</sub>. (B) H<sup>+</sup> (C) N<sub>2</sub> (D) HCO<sub>3</sub><sup>-</sup>.

33- What is the location of the respiratory center that regulate respiratory function?

- (A) Cerebrum. (B) Brain stem. (C) Hippocampus. (D) Spinal cord.

34- How can the respiratory center regulate body core temperature in dog?

- (A) By increase respiration. (B) By panting. (C) By increase ventilation. (D) By decrease ventilation.

35- One of the functions of saliva are

- (A) Decrease gastric digestion. (B) Increase bile secretion.  
(C) Absorption of vit-B12. (D) Increase intestinal motility.

36- Which part of the stomach that contains cells which produce only mucus and buffer without acid or proteolytic enzymes?

- (A) Cardia stomach. (B) Fundic stomach. (C) Esophageal stomach. (D) Pyloric stomach.



- 37- Gastric pits lined with mucus secreting cells to protects the gastric mucosa from**  
(A) Acid and proteolytic enzymes. (B) Intrinsic factor.  
(C) Base and proteolytic enzymes. (D) Somatostatin.
- 38- Delta cells of gastric mucosa secrete**  
(A) Somatostatin. (B) Gastrin. (C) Substance P. (D) Serotonin.
- 39- The cephalic phase of gastric secretion is stimulated by**  
(A) Sight and smell of the food. (B) Presence of food in the stomach.  
(C) Presence of food in the duodenum. (D) Presence of food in the colon.
- 40- In the rumen Carbon dioxide is produced from**  
(A) Fermentation of carbohydrates. (B) Eructation. (C) Bacteria. (D) Protein.
- 41- Fermentation compartment position distal to the small intestine called**  
(A) Forestomach. (B) Hindgut. (C) True stomach. (D) Esophageal grove.
- 42- Main function of the abomasum is**  
(A) Absorption of water and other substance. (B) Home of bacteria.  
(C) Secretes digestive juice and mucous. (D) Absorption of VFAs.
- 43- One important function of microorganisms in rumen is**  
(A) To synthesized vitamin K.  
(B) To protect the gut from ulcer.  
(C) To convert poor quality diet into more utilizable nutrients.  
(D) To synthesized vitamin B12.
- 44- Which of the following area in the brain regulate temperature?**  
(A) Hypothalamus. (B) Medulla oblongata.  
(C) Thalamus. (D) Reticular formation.
- 45- Nuclei involved in the control of the respiratory and cardiovascular system**  
(A) Medulla oblongata. (B) Thalamus.  
(C) Hypothalamus. (D) Midbrain.
- 46-Which of the following area estrogen secreted?**  
(A) Theca interna and granulose cells of the ovarian follicles. (B) Corpus albicans.  
(C) Corpus hemorrhagicum. (D) Ovarian fallopian tube.
- 47-Which of the following hormones is present in the urine in early pregnancy and it is the basis of the laboratory tests?**  
(A) Human chorionic somatomammotropin (HCS). (B) Progesterone.  
(C) Estrogen. (D) Human chorionic gonadotropin (HCG).

48-Which of the following, hormone induce contraction of the myoepithelial cells of mammary gland alveoli and milk letdown ?

- (A) Prolactin. (B) Estrogen.  
(C) Relaxin. (D) Oxytocin.

49-The immature ovarian follicles, which consists of an oocyte surrounded by a single layer of epithelial cells is called

- (A) Growing follicles. (B) Primordial follicles.  
(C) Graafian follicles. (D) Atretic follicles.

50- How does growth hormone exert its growth-promoting effects?

- (A) By directly stimulating cell division. (B) By inhibiting protein synthesis.  
(C) By promoting bone resorption. (D) By stimulating the synthesis of somatomedins..

51-Nerve terminals in brain areas responsible for long-term behavior and memory is secreted \_\_\_\_\_.

- (A) Nitric oxide. (B) Glutamate.  
(C) Gamma-aminobutyric acid (GABA). (D) Serotonin.

52- Smooth muscle myosin must be phosphorylated in order  $Ca^{++}$  bind to \_\_\_\_\_.

- (A) Troponin C (B) Tropomyosin. (C) Actin. (D) Calmodulin.

53- Stimulation of sympathetic nervous system to the eye caused \_\_\_\_\_.

- (A) Pupillary constriction. (B) Pupillary dilation.  
(C) Close the eye. (D) Open the eye.

54- The parasympathetic nervous system is called \_\_\_\_\_.

- (A) Thoracolumbar. (B) Craniosacral. (C) Cervical. (D) Sacral.

55- All preganglionic neurons of autonomic nervous system are \_\_\_\_\_.

- (A) Adrenergic neuron. (B) Cholinergic neuron.  
(C) Both adrenergic and cholinergic neuron. (D) Dopaminergic.

56- A condition opposite to anemia is \_\_\_\_\_.

- (A) Polycythemia. (B) Erythema.  
(C) Erythrocytosis. (D) Leucosis.

57- \_\_\_\_\_ granules in the neutrophil lysosomes which supply enzymes to digest the ingested bacteria, viruses, and cellular debris.

- (A) Azurophilic. (B) Basic.  
(C) Alpha. (D) Dense.

58- Iron transported across membranes must be in its \_\_\_\_\_ state.

- (A) Ferrous. (B) Ferric.  
(C) Apoferrin. (D) Lactoferrin.



59- The normal position of the oxygen-hemoglobin dissociation curve depends on the concentration of 2,3-DPG and \_\_\_\_\_ ions and CO<sub>2</sub> in the red cell and on the structure of the hemoglobin molecule.

- (A) H<sup>+</sup>. (B) HCO<sub>3</sub><sup>-</sup>.  
(C) Na<sup>+</sup>. (D) O<sub>3</sub><sup>+</sup>.

60- Embryonic hemoglobin is present in the embryo and is made up of two alpha and two \_\_\_\_\_ chains.

- (A) Epsilon. (B) Delta.  
(C) Gamma. (D) Beta.

61 -The active movement of neutrophils and other leukocytes out of intact blood vessels and into the interstitial fluid is called \_\_\_\_\_.

- (A) Diapedesis. (B) Chemotaxis.  
(C) Filtration. (D) Agglutination.

62- \_\_\_\_\_ is responsible for ESR formation?

- (A) Agglutination formation. (B) Coagulation formation.  
(C) Rouleaux formation. (D) Fibrinogen formation.

63- The volume of air that remains in the lungs after a maximum forced expiration is called \_\_\_\_\_.

- (A) Tidal volume. (B) Inspiratory reserve volume.  
(C) Expiratory reserve volume. (D) Residual volume.

64- \_\_\_\_\_ is the total pressure of a mixture of gases equals the sum of all the partial pressures.

- (A) Dalton's Law. (B) Helton Law. (C) Pressure Law. (D) Gas Law.

65- Chief cells in fundus of the stomach secreted \_\_\_\_\_.

- (A) Hydrochloric acid (HCl). (B) Pepsinogen. (C) Mucous. (D) Intrinsic factor.

66- Excessive formation of VFAs in the rumen causes \_\_\_\_\_.

- (A) Acidosis. (B) Alkalosis. (C) Diarrhea. (D) Vomiting.

67- Nitrogen utilized by microbes for \_\_\_\_\_ formation.

- (A) Urea. (B) Protein. (C) Methane. (D) Carbone dioxide.

68-Renal control of acid -base balance is depended on HCO<sub>3</sub><sup>-</sup> reabsorption and \_\_\_\_\_ excretion into urine.

- (A) H<sup>+</sup>. (B) H<sub>2</sub>O. (C) CO<sub>2</sub>. (D) NaOH.

69- The renal threshold for glucose is \_\_\_\_\_.

- (A) 100 mg/dl. (B) 90mg/dl. (C) 120mg/dl. (D) 180mg/dl.

70- The kidney secretes all of the following's hormone except \_\_\_\_\_.  
(A) Erythropoietin. (B) Renin. (C) Vasopressin. (D) 1,25 Dihydroxy cholecalciferol

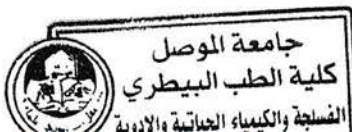
**Q2. Answer the following by marking T (True) or F (False): (30 Marks)**

- 1- Gap junctions are present in cardiac muscle and provide the pathway for rapid spread of excitation from one cardiac muscle fiber to another.
- 2- Stimulation of sympathetic nervous system to the eye caused Pupillary constriction.
- 3- The rate of vit. B12 absorption affect the absorption of iron from the intestinal epithelium into the blood.
- 4- Vitamin K with vitamin B12 in the food makes the B12 available for absorption by the gut.
- 5- Free bilirubin appear in high concentrations in the plasma and interstitial fluids leads to Bilirubinemia.
- 6- After activation of FX, there is a common pathway for the formation of thrombin, after which fibrin is formed from fibrinogen.
- 7- Newborn ruminant rumen is Functional.
- 8- Type of motility of the esophagus is segmented contraction.
- 9- Electrolytes are absorbed in ruminant from small intestine.
- 10- Types of stomach cells secreted hydrochloric acid (HCL) is parietal cells.
- 11- Muscular folds at the lower end of the esophagus that come together to bypass the rumen, reticulum and omasum to abomasum when the calf drinks milk is called Esophageal groove.
- 12- Enzyme hydrolyzed urea to ammonia and carbon dioxide in the rumen is Protease.
- 13- Substance increase the secretion of bile is Micelles.
- 14- Sodium is most completely re-absorbed in the kidneys.
- 15- Most of the sodium is reabsorbed in the kidneys collecting ducts.
- 16- The part of nephron impermeable to water is descending limb of loop of Henle.



- 17- The area that controls the voluntary movements of skeletal muscle of the opposite side of the body is called sensory area.
- 18- Most excess cytoplasm of spermatid is separated and left in the Sertoli cell during spermiogenesis.
- 19- The seminal vesicles secrete phosphate ions give the seminal fluid acidity helps to inhibit sperm fertility.
- 20- The period of sexual receptivity, during which ovulation occurs and the corpus luteum begins its formation is called proestrus .
- 21- The adrenal cortex secretes glucocorticoids called Zona fasciculata.
- 22- The production and secretion of melatonin stimulates activity of the supra chiasmatic nucleus in the hypothalamus.
- 23- Some cells secrete chemicals into the extracellular fluid that act on cells in the same tissue. refers to type of regulation called Paracrine.
- 24- The main function of aldosterone is regulation of blood glucose levels.
- 25- The function of the thymus gland is production of T cells.
- 26- Proliferative phase in which spermatogonia change to spermatocytes.
- 27- Acrosome contains prostaglandins, a powerful proteolytic enzyme (can digest proteins) allowing the sperm to enter the ovum and fertilize it.
- 28- On coming in contact with the fluids of the female genital tract, multiple changes occur that activate the sperm for the final processes of fertilization. These collective changes are called Capacitation of the spermatozoa.
- 29- Amplification of the signal is the basis of the sensitivity of the endocrine system.
- 30- A hormone produced by the C cells of the thyroid gland and decreases calcium movement from the bone into the blood is called calcitonin.

Good Luck



Handwritten signature in Arabic script, likely of the author or instructor, with the name 'الأستاذ الدكتور' (Professor Doctor) visible.