	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology and Entomology Department	Program: Chemistry and Entomology Level : (3) Date: 12/1/2026 Time: 2 h	
Course Title: Insect Physiology			Code: 343 Z
Instructors: Dr. Doaa S.Mohamed & Dr. Asmaa Metwaly			
Important:	No. of pages 3	No. Of questions 6	Total Mark:50 degree

Answer the following questions

First Question: Choose the best correct answer: (15 marks)

1. .....is the main excretory product by aquatic insects, very toxic substance and require large amount of water for elimination.
   a) Uric acid. b) Ammonia. c) Urea. d) Amino acids.
2. ..... is the major complex polysaccharide present in plant tissue, cannot be digested by most insects.
   a) Trehalose. b) Cellulose. c) Starch. d) Sucrose.
3. Functions of haemolymph include ..... .
   a) Thermoregulation. b) Lubrication. c) Protection. d) All previous answers.
4. ..... is a contraction phase of heart contraction of muscles of heart wall.
   a) Diastole. b) Systole. c) Diastasis. d) Presystolic notch.
5. ..... are present in the hindgut, capable of absorbing inorganic ions from the dilute solutions.
   a) Nephrocytes b) Crystal cells. c) Chloride cells. d) Spherule cells.
6. ..... which transport potassium ions (K^+) from hemolymph to the gut lumen to maintain ionic balance inside the midgut.
   a) Columnar cells. b) Goblet cells. c) Regenerative cells. d) spherule cells
7. In springtails, ... are supposed to be involved in excretion.
   a) Nephrocytes b) Labial glands c) Utricular glands d) Fat body.
8. ..... are the stem cells from which other haemocytes are derived.
   a) Plasmatocytes. b) Proleucocytes. c) Adipohaemocytes. d) Granulocytes.
9. What are epidermal cells secreted first at molting?
   a) Epicuticle b) Wax c) Cuticulin d) Procuticle
10. Which of the following secrete ecdysone hormone?
    a) Neurosecretory cells b) Corpora cardiaca c) Corpora allata d) prothoracic gland
11. What is protocerebrium usually innervate?
    a) Labrum b) labium c) Compound eyes d) Antannae
12. What is the main function of oenocytes?
    a) Lipid secretion & metabolism.
    b) Protein secretion & metabolism.
    c) Production of material of the cell plasma membrane.
    d) Secretory substances necessary to synthesize cuticle.

13. **Small paired bodies situated behind the brain, they function as storage and release of AH.**
    a) Neurosecretory cells b) Prothoracic gland c) Corpora allata d) Corpora cardiaca
14. **In which the following orders, the Weismann's ring located.**
    a) Coleoptera b) Hymenoptera c) Diptera d) Lepidoptera
15. **How many times is the size of the pore canals larger than the wax canals?**
    a) 5 – 10 Times b) 10 – 15 Times c) 15 – 20 Times d) 10 – 20 Times

Second Question: Put (True) or (False) in front of the following substances: (10 Marks)

1. Mosquitoes spend the entire life on one host, extremely host- specific. ( )
2. The dorsal vessel has the primary role in the circulation of hemolymph around the body. ( )
3. Carbohydrate-digesting enzymes are secreted only by the salivary glands. ( )
4. Cryptonephridial arrangement in which, the distal ends of the Malpighian tubules are lying freely in the body cavity. ( )
5. The ionic composition of hemolymph plasma is not highly variable in different insects. ( )
6. Some of the hardest parts of cuticle do not contain chitin. ( )
7. Moulting fluid contain proteinases & chitinase that digest proteins and chitins of old procuticle. ( )
8. JH – III has gonadotropic action in all insect. ( )
9. Juvenile hormone is shown to have some inhibitory effect on spermatogenesis. ( )
10. Physical colour by scattering results from the reflection of light from multiple surfaces stacked on top of each other, separated by specific distances. ( )

Third Question: Write the suitable terminology of the following sentences. (5 Marks)

1. Insects that primarily feed on plants, attack various parts such as leaves, roots, stems, flowers, and fruits. (.....).
2. Structures that maintain circulation through the appendages of insects. (.....).
3. Aggregation of haemocytes around clusters of microbes. (.....).
4. The retention of the wastes in "out of the way places" within the body. (.....).
5. Secretion in which parts of the cell or the entire midgut cell may disintegrate and release enzymes into the gut lumen. (.....).
6. The tanning hormone which controls of darkening and hardening of the cuticle and wing expansion. (.....).
7. It's the way insects grow and mature. (.....)
8. A ballon-like sac makes by Diptera to facilitate ecdysis. (.....)
9. Smaller passageways through the epicuticle. (.....)
10. The separation space of the epidermis and old cuticle. (.....)

Fourth Question: Write the functions of the following: **(5 marks)**

1. Free amino acids.
2. Nephrocytes.
3. The aorta.
4. The color of insects.
5. Wax layer of epicuticle.

Fifth Question: Give a reason of the following. **(5marks)**

1. PTG are lost during the early part of adult.
2. The moulting process depends on the amount of JH.
3. Formation of the pore canals has not been entirely resolved.
4. Greens and blues of insects are structural colors.
5. Ecdysone involved in control of oogenesis in female mosquitoes, despite the absence of PTG in adult.

Sixth Question: Write short notes about four parts only of the following: (10 marks)

1- What is encapsulation in insects?
2- What are the gastric caeca? What function do they have?
3- Explain the importance of studying insect physiology?
4- The origin of basement membrane.
5- Phenomenon of disruptive color.
6- The cuticle sclerotization and tanning with equations.

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With best wishes

Dr/ Doaa S. Mohamed *Dr/ Asmaa Metwaly*

CV

	Assiut University – Faculty of Science First Semester – Final Exam 2025 – 2026 Zoology and Entomology Department	Program: Zoology and Entomology Level: 3 Date: 14/1/2026 Time: 2 h	
Course Title: Molecular and Cell Biology		Course Code: 318 Z	
Instructor: Dr. Mahmoud S. M. Abdelrasoul			

Important:	No. of pages 4	No. of questions 3	Total Mark: 50 marks

I- Choose the correct answer for the following questions (30 marks):

1- Distinguish between prokaryotic and eukaryotic cells based on nucleus presence. ■
- **A.** Both lack nuclei
- **B.** Only prokaryotes have nuclei
- **C.** Only eukaryotes have true nuclei
- **D.** Both have nuclear envelopes

2- Explain the role of ribosomes in the cell. ■
- **A.** Lipid synthesis
- **B.** Protein synthesis
- **C.** DNA replication
- **D.** ATP production

3- Apply your understanding to predict where proteins for secretion are synthesized. ●
- **A.** Free ribosomes
- **B.** Mitochondria
- **C.** Ribosomes attached to ER
- **D.** Lysosomes

4- Recall the protein subunits forming microtubules. Δ
- **A.** Actin and myosin
- **B.** α- and β-tubulin
- **C.** Collagen and elastin
- **D.** Keratin dimers

5- Identify the main component of the plasma membrane. Δ
- **A.** Triglycerides
- **B.** Phospholipid bilayer
- **C.** Cellulose
- **D.** Peptidoglycan

6- Apply diffusion principles to predict movement of O_2 across membranes. ●
- **A.** Requires ATP
- **B.** Via protein channels only
- **C.** From low to high concentration
- **D.** Directly through lipid bilayer

7- Recall the function of the glycocalyx. Δ
- **A.** ATP synthesis
- **B.** DNA replication
- **C.** Cell recognition
- **D.** Protein folding

Δ Remember ■ Understand ● Apply ◊ Analysis * Evaluate ◯ Create

8- **Apply knowledge to identify RNA polymerase II function.**
A. rRNA synthesis
B. tRNA synthesis
C. mRNA synthesis
D. DNA replication

9- **Recall the bond linking amino acids.**
A. Hydrogen bond
B. Ionic bond
C. Disulfide bond
D. Peptide bond

10- **Recall where ribosome assembly occurs.**
A. Cytoplasm
B. Golgi
C. Nucleolus
D. ER

11- **Recall stop codon function.**
A. Initiates translation
B. Binds tRNA
C. Terminates translation
D. Splices RNA

12- **Analyze why cholesterol is important in animal cell membranes.**
A. Prevents protein synthesis
B. Increases membrane rigidity only
C. Regulates membrane fluidity
D. Forms ion channels

13- **Identify the transport mechanism that does NOT require energy.**
A. Active transport
B. Facilitated diffusion
C. Endocytosis
D. Exocytosis

14- **Identify the organelle responsible for ATP production.**
A. Lysosome
B. Golgi apparatus
C. Mitochondrion
D. Ribosome

15- **Analyze the consequence of ribosome malfunction.**
A. DNA replication stops
B. Lipid digestion increases
C. Protein synthesis decreases
D. ATP production increases

16- **Identify the organelle involved in protein modification and sorting.**
A. Nucleus
B. Lysosome
C. Golgi apparatus
D. Ribosomes

17- **Describe the role of lysosomes in the cell.**
A. Protein synthesis
B. Intracellular digestion
C. ATP generation
D. Transcription

18- **Describe the role of DNA helicase during replication.**
A. Synthesizes RNA primers
B. Joins Okazaki fragments

Δ Remember ■ Understand ● Apply ◊ Analysis * Evaluate ○ Create

C. Unwinds the DNA helix
D. Proofreads DNA

19- **Identify the enzyme that synthesizes RNA primers.** Δ
A. DNA polymerase I
B. Helicase
C. DNA ligase
D. Primase

20- **Analyze why the lagging strand is synthesized discontinuously.** ◊
A. DNA polymerase works slowly
B. DNA strands are antiparallel
C. Helicase activity stops
D. RNA primers are absent

21- **Describe the function of DNA ligase.** ■
A. Separates DNA strands
B. Synthesizes nucleotides
C. Joins DNA fragments
D. Removes RNA primers

22- **Describe the promoter's role in transcription.** ■
A. Terminates RNA synthesis
B. Binds ribosomes
C. Removes introns
D. Binds RNA polymerase

23- **Identify the RNA type that carries genetic information to ribosomes.** Δ
A. rRNA
B. tRNA
C. mRNA
D. snRNA

24- **Describe the function of rRNA.** ■
A. Genetic storage
B. Enzymatic and structural role in ribosome
C. Amino acid transport
D. Lipid synthesis

25- **Analyze how ER and Golgi cooperate in protein secretion.** ◊
A. ER synthesizes lipids, Golgi degrades them
B. ER synthesizes proteins, Golgi modifies and sorts them
C. Golgi synthesizes DNA
D. ER stores ATP

26- **Analyze how membrane permeability affects cell homeostasis** ◊
A. Prevents metabolism
B. Maintains internal balance
C. Stops transcription
D. Destroys proteins

27- **Describe the role of nuclear pores.** ■
A. Regulate transport between nucleus and cytoplasm
B. DNA replication
C. Protein synthesis
D. Ribosome assembly

28- **Describe the main structural feature that gives the plasma membrane its fluid nature.** ■
A. Rigid cellulose framework
B. Fixed protein lattice

Δ Remember ■ Understand ● Apply ◊ Analysis * Evaluate ◯ Create

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C. Presence of DNA
D. Lateral movement of phospholipids

29- Identify the membrane transport that moves substances against gradient. Δ

A. Diffusion
B. Active transport
C. Osmosis
D. Facilitated diffusion

30- Apply transcription knowledge to predict RNA polarity. ●

A. RNA is antiparallel to DNA template
B. RNA is parallel
C. RNA is circular
D. RNA has thymine

II- Answer the following questions (10 marks):

1- Evaluate differences between prokaryotic and eukaryotic cells with examples. *

2- Create a logical flow explaining the Central Dogma of Molecular Biology. ○

III- Answer <u>one only</u> from the following questions (10 marks):

1- Explain the molecular structure of microtubules, their key cellular functions, and their critical involvement in regulating the cell cycle. ■

2- Explain the detailed mechanism of DNA replication including the major steps, the enzymes required at each stage, and the proofreading mechanisms that correct errors. Δ

End of Exam

Best Wishes

Dr. Mahmoud S. M. Abdelrasoul

Δ Remember ■ Understand ● Apply ◊ Analysis * Evaluate ○ Create

جامعة أسيوط - كلية العلوم
قسم علم الحيوان
اختبار مادة البيئة المائية (٣٢٣ح) ٢٠٢٥-٢٠٢٦
الزمن: ساعتان.

أجب عن الأسئلة الآتية:

س١: اختـــر الإجابة الصحيحة من بين الأقواس:(5 درجات):

1- The chemical factors in the aquatic ecosystem include (nutrients- chemosynthetic bacteria – waves –heat - all).
2-(Euryhaline – Stenohaline – both) are salt intolerant species.
3- The marine ecosystem covers about (71% - 97% - 79%) of the earth`s surface.
4-The freshwater ecosystem generates about (3% - 41%- 14%) of the net primary production.
5- (Streams – ponds - all) are classified under lentic waters.
6- (The limnetic zone – the littoral zone – the intertidal zone- all) is the open water of the lake.
7- (The epilimnion – the metalimnion – the hypolimnion) is the deepest portion of the lake.
8- In lakes; there is rarely any stable vertical stratification of chemical constituents in the (pelagic zone – intertidal zone – littoral zone).
9-(Zooplankton – phytoplankton -plankton) include all weakly swimming organisms.
10-Rivers in semiarid climates tend to have excess (nitrates – phosphates –all).

س٢ : ضع الرقم المناسب من فقرات العمود (A) أمام ما يناسبه من فقرات العمود B) (١٥ درجة):-

A	B
1- Attenuate floods	+ are provided in lakes by bacterial and fungal decomposition ( )
2-Marine ecosystem	+ Are common nutrients needed in large quantities for cell development ( ).
3-Euryhaline organisms	+ Is the place where the river meets the sea ( ).
4- Light	+ Have fast unidirectional water flow ( ).
5-Ponds and Lakes	+ Are stronger swimming organisms ( ).
6- Biological activity	+ Is the end product of eutrophication ( ).
7-The intertidal zone	+ Gives a good indication of eutrophication ( ).
8- Humic acid	+Has an average salinity of 35‰ ( ).
9-BOD	+ Is one of the functions of aquatic ecosystem ( ).
10- Detritus	+ are salt tolerant ( ).
11- Nekton	+ Considered as abiotic characteristic of aquatic ecosystem ( ).
12-Streams and Rivers	- Considered as lentic waters ( ).
13- The Estuary	+ Is considered as a factor that determines any aquatic structure ( ).
14-SIO_2-SO_4-Fe	+ Is the area between high and low tide ( ).
15- Acetate and glycolate	+ considered as a refractory compound in natural waters ( ).

س٣: أكتب المصطلح العلمي الدال على كل عبارة مما يأتي: (١٥ درجة):-

1- An organic compound secreted by some algae and fungi which gives a musty odor to water.
2- One of the limiting factors of corals responsible for the absence of reefs in the estuaries.
3- A substance secreted by corals which prevent dehydration.
4-Vertebrate animals very sensitive for acid rains.
5-An organic substance which may be leached from soil as a result of acid rains.
6- An area of the lake rich in nutrients.
7- A distinct physical structure in streams occurs in flatter portions of the water course.
8-A factor which affects the structure of the estuary.
9- A type of lakes that has chemical classification depending on microbial processes.
10- A group of organisms that live in symbiosis with corals.

س ٤: (١٥ درجة):- علل لما يأتي معطيا سببا واحدا لكل حالة:

1-There is rarely any stable vertical stratification of chemicals in the littoral zone of aquatic ecosystems.
2-Snails are severely affected by acid rains.
3-Human impact increases acid rains.
4-In some lakes eutrophication does not occur in spite of increasing nutrients.
5-Lakes having granite basin are not suitable for fish culture.
6-Rivers situated in arid regions have excess phosphate.
7-Death of a lot of animals as a result of eutrophication.
8-Some lakes are not heavily affected by acid rains.
9-Increasing of biodiversity in estuaries.
10- Increasing of biodiversity in streams.

With best wishes

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology and Entomology Department	Program: Zoology & Zoology-Chemistry Level : (3) Date: 10/01/2026 Time: 2 h	
Course Title: Molecular Biology		Code: 311 Z	
Instructors: Prof. Dr. Abo bakr M. Eltayeb			
Important:	No. of pages 3 / No. Of questions 5	Total Mark:50 degrees	

I- Choose the correct answer: *(15 marks, one mark for each)* Δ■

1- **DNA form is more commonly found in RNA?** a- A-form b- B-form c- Z-form d- not mentioned	2- **prokaryotic mRNA is …….** a- monogenic b- not modified c- polycistronic d- translated in the nucleus
3- **……is a conserved eukaryotic promoter element close to -80 bp from the start point (+1).** a-TATA box b- CAAT box c- CAP site d- GC box	4- **Topoisomerase III (Topo III) is particularly important for:** a- Initiating DNA replication b- Synthesizing RNA primers c- Removing catenates formed in DNA d- Methylating DNA
5- **In eukaryotes, which polymerases are the principle replicative enzymes?** a- Pol α and Pol β b- Pol δ and Pol ε c- Pol γ and Pol α d- Pol β and Pol γ	6- **In eukaryotic ……has both RNA-DNA polymerase activities** a- Pol ε b- Pol β c-Pol δ d- Pol α
7- **RNA polymerase I synthesizes:** a- mRNA precursors b- tRNA and 5S rRNA c- 5.8S, 18S, and 28S rRNA d- snRNA only	8- **The TATA box consensus sequence is:** a- TATA b- TAATA c- TATAA d- TATTA
9- **Luciferase (LUC) reporter gene:** a- Produces colored luciferase b- neutralizes luciferin c-Fluoresces green d- Oxidizes luciferin and emits photons	10- **A missense mutation:** a- Produces the same amino acid b- Results in a different amino acid c- Creates a stop codon d- Has no effect
11- **Which of the following transcription factors stay until elongation of mRNA is finished.** a- TFIID b- TFIIB c- TFIIE d- TFIIH	12- **Which of the following arms of tRNA contains pseudo uridine.** a-D arm b- T Ψ C arm c- anti codon arm d- amino acid acceptor arm
13- **In E. coli mismatch repair system…… nicks the DNA at the nearest unmethylated GATC site.** a- MutS b- MutL c- MutH d- exonuclease I	14- **The signal recognition particle (SRP) contains:** a- 7 amino acids polypeptides b- DNA and proteins c- 7S RNA and 17 amino acids polypeptides d- 6 polypeptides and 7S RNA
15- **hnRNA contains:** a- Only exons b- Only introns c-Both exons and introns d- Neither exons nor introns	

Draw this table in your answer booklet and make your answers there.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Δ Remember ■Understand •Apply ◊Analysis *Evaluate ◯Create

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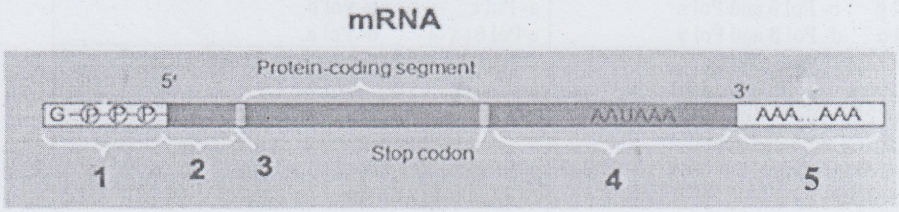
II-Put (T) or (F) for true or false sentences, respectively. *(10 marks, one mark for each)* Δ■

1- In hnRNA splicing, the intron is released along with snRNPs (U2, U4, and U6).	2- The loop of the anticodon arm of tRNA contains 5 unpaired nucleotides.
3- Eukaryote genes are grouped in operons.	4- Introns are transcribed into precursor mRNA.
5- Small nuclear RNAs (snRNAs) have 5` cap.	6- tRNA is a non-coding RNA.
7- The TATA-binding protein (TBP) is a subunit of TFIID.	8- An indel of 3 base pairs always causes a frameshift.
9-In prokaryotes, transcription of a gene and translation of the resulting mRNA occur simultaneously.	10- Prokaryotes have one type of RNA polymerase for all types of RNA.

Draw this table in your answer booklet and make your answers there.

1	2	3	4	5	6	7	8	9	10

III- Complete the missing labels of the following diagram. *(5 marks, one mark for each)* Δ



Draw this table in your answer booklet and make your answers there.

1	2	3	4	5

IV- Write the scientific term(s) that describe the following sentences, *(5 marks, one mark for each)* Δ

1- Sequences of DNA that are related to known genes but no longer possess the ability to code for a protein.
2- Enzymes recognize short DNA sequences (4 or 6 bp) and cut both strands of DNA at those sequences.
3- A cellular structure responsible for the degradation of proteins marked with ubiquitin.
4- 6 proteins complex found in mammalian telomere.
5- The DNA sequence from the start codon to the stop codon.

Draw this table in your answer booklet and make your answers there.

1	2	3	4	5

V- **Write short notes about.** *(15 marks, 5 marks for each)* Δ ■ ●

1- Different types of Non-coding RNAs (ncRNAs).
2- Main types of gene delivery methods.
3- Topoisomerase II inhibitors can be used as anti-cancer drugs, explain why, and why these drugs targeting cancer cells efficiently, what are the other cells affected by these drugs?

End of Exam

Best Wishes **Prof. Dr.** Abo bakr M. eltayeb

C-

Assiut University
Faculty of Science
Zool. & Entomol. Dept.

Final Exam. for Zoology Students
Animal Behavior (313 Z)

First semester,
2025 / 2026
Time: Two hours

*The exam comes on **three** pages*
Total: 50 marks

Part I. Choose the correct answer and transfer its number to the answering notebook: (22 marks)

1. **Chemical signals exchanged between a plant and an animal may be called:**
   a) Pheromones
   b) Semiochemicals
   c) Allelochemicals

2. **Which animal has been shown to count up to seven?**
   a) Domestic hens
   b) Rhesus monkeys
   c) Capuchin monkeys

3. **Konrad Lorenz is known for his discovery of:**
   a) Operant conditioning
   b) Imprinting
   c) Insight learning

4. **The ability of animals to classify shapes into categories reflects:**
   a) Insight learning
   b) Aristotelian logic
   c) Numerical extrapolation

5. **Releaser pheromones differ from primer pheromones because they:**
   a) Act slowly on the endocrine system
   b) Elicit rapid behavioral responses
   c) Affect only reproductive behavior

6. **Among the features of imprinting is that it is:**
   a) Gradual and reversible
   b) Learned through imitation
   c) Rapid and irreversible

7. **There is no conclusive evidence for pheromone use in:**
   a) Mammals
   b) Reptiles
   c) Birds

8. **The hygienic behavior in honey-bees is inherited in a:**
   a) Dominant way
   b) Polygenic way
   c) Recessive Mendelian way

9. **Classical conditioning involves pairing a neutral stimulus with:**
   a) A punishment
   b) A conditioned response
   c) An unconditioned stimulus

10. **In *Aplysia*, repeated harmless stimulation leads to:**
    a) Re-sensitization
    b) Ignoring the stimulus
    c) Insight learning

11. **The mirror test is used to assess an animal's ability to:**
    a) Recognize itself
    b) Understand spoken language
    c) Solve problems

12. **Deliberate deception in chimpanzees may involve:**
    a) Playing blind
    b) Sending a false signal
    c) Mimicking human speech

More questions on next page >>

13. Hygienic behavior in honeybees mainly serves to:
a) Increase honey production
b) Maintain colony health
c) Improve communication

14. Accelerated puberty of a female exposed to a mature male is called:
a) Whitten effect
b) Vandenbergh effect
c) Lee–Boot effect

15. Insight learning differs from other types of learning in that:
a) It occurs gradually
b) It depends on conditioning
c) It appears suddenly

16. Trial-and-error learning was experimentally demonstrated by:
a) Ivan Pavlov
b) Edward Thorndike
c) B. F. Skinner

17. According to Weber's law, quantity comparison becomes easier when:
a) The absolute size of the numbers increases
b) The numerical distance between quantities increases
c) The quantities are very small

18. The myth of lemming suicide became widely popular mainly because of:
a) Scientific observations in the Arctic
b) A documentary film released in 1958
c) Indigenous folklore of northern peoples

19. The Clever Hans Effect refers to:
a) Genuine animal arithmetic ability
b) Animals learning through imitation
c) Unintentional hints from human observers

20. Chimpanzees can arrange Arabic numerals by:
a) Memorizing fixed sequences only
b) Arranging them in ascending order on a screen
c) Solving written equations

21. In reality, lemming mass deaths are best explained by:
a) Intentional self-destructive behavior
b) Random genetic defects
c) Migration and dispersal during population growth

22. The occurrence of Weber's law effects in both humans and animals suggests:
a) Animals depend on language to count
b) Animals and humans have similar mechanisms of processing numbers
c) Animals use trial-and-error learning only

More questions on next page >>

Part II. Answer *only four* of the following questions: (28 marks)

1) Compare between imprinting and insight learning. Give examples and explain the biological significance of the two types of learning.

2) Classify the human pheromones and provide specific examples for each type.

3) Describe three forms of deliberate deception in animals, explaining why such deception is considered cognitive rather than innate.

4) Write an essay on the different schools of animal behavior, with emphasis on the school that had the most important contribution to behavioral science.

5) Discuss three of the pheromone-associated phenomena in rodents and explain their biological significance.

End of questions

Examiner: Prof. Medhat M. Sadek

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology & Entomology Department	Program: Zoology Level: (3) Date: 21/1/2026 Time: 2 h	
Course Title: Histochemistry		Code: 316 Z	
Instructors: Dr. Ahmad U. M. Mahmoud			
Important: -	No. of pages 6	No. Of questions 2	Total Mark:50 degree

Q1: Choose the correct answer from "A, B, C, or D" on the provided bubble sheet:

(35 marks, one mark for each)

1 ■	**Which of the following statements correctly describes the classification of glycoproteins?** **A)** They are simple proteins composed solely of amino acids. **B)** They are conjugated proteins formed by the combination of proteins with carbohydrates. **C)** They are derived lipids that function as membrane receptors. **D)** They are fibrous proteins that provide structural support to tissues.
2 ■	**Masson's Trichrome stain is commonly used in histology to demonstrate fibrous proteins. Which of the following best explains the principle of this staining method?** **A)** It depends on the physical configuration and structural arrangement of protein molecules in tissues. **B)** It relies on the specific chemical reactivity of amino acid side chains in fibrous proteins. **C)** It uses fluorescent antibodies to bind selectively to collagen and elastin fibers. **D)** It stains lipids associated with connective tissue to highlight protein structures.
3 Δ	**The Millon's reaction is a histochemical test used to detect the presence of a specific amino acid in proteins. Which amino acid is targeted by this reaction?** **A)** Arginine. **B)** Cysteine. **C)** Tyrosine. **D)** Proline.
4 Δ	**Lipids are defined by their solubility properties. In which type of solvents are lipids most soluble?** **A)** Polar solvents such as water and ethanol. **B)** Acidic solutions like dilute hydrochloric acid. **C)** Basic solutions such as sodium hydroxide. **D)** Non-polar organic solvents like chloroform and ether.
5 ■	**The fundamental principle behind staining lipids with oil-soluble dyes, such as Sudan III or Oil Red O, is based on which physical property?** **A)** The dye is more soluble in the aqueous tissue fluid than in the lipid droplets. **B)** The dye forms a covalent bond with the fatty acid chains. **C)** The dye is more soluble in the lipid than in the solvent used to prepare the staining solution. **D)** The dye fluoresces when bound to unsaturated bonds.
6 Δ	**Which type of microscopy can be used to directly visualize purine and pyrimidine bases in nucleic acids without the need for additional staining reagents?** **A)** Phase-contrast microscopy. **B)** Ultraviolet (UV) microscopy. **C)** Bright-field light microscopy. **D)** Polarizing microscopy.
7 ■	**Toluidine blue is an example of a metachromatic dye. What change occurs when it binds to highly acidic structures like nucleic acids?** **A)** It changes from blue to a reddish-purple color.

	B) It becomes fluorescent under UV light. C) It loses all color and becomes transparent. D) It changes from red to a deep blue color.
8 Δ	**The Feulgen reaction is a classic histochemical technique used for the specific demonstration of which nucleic acid?** A) Ribonucleic acid (RNA). B) Deoxyribonucleic acid (DNA). C) Both DNA and RNA simultaneously. D) Adenosine triphosphate (ATP).
9 Δ	**Disaccharides are formed by linking two monosaccharide units. What is the name of the covalent bond that joins these sugar molecules?** A) Peptide bond. B) Ester bond. C) Phosphodiester bond. D) Glycosidic bond.
10 ■	**Carbohydrates play a crucial role in cell surface recognition and signaling. This function is primarily mediated by which of the following structures?** A) The phospholipid bilayer of the membrane. B) The nuclear envelope and pores. C) The mitochondrial cristae. D) Glycocalyx, containing glycoproteins and glycolipids.
11 ■	**Enzyme activity is highly dependent on the surrounding environment. Which of the following factors is NOT a primary condition affecting enzymatic activity?** A) Magnetic field strength. B) Temperature. C) pH. D) Ionic concentration.
12 ■	**The active site of an enzyme is a critical region responsible for its catalytic function. What is the primary role of the enzyme's active site?** A) To store ATP for energy-dependent reactions. B) To bind specifically to the substrate and facilitate its conversion to product. C) To provide structural stability to the enzyme molecule. D) To transport the enzyme to its correct cellular location.
13 ■	**Freeze-drying, also known as lyophilization, is a preferred tissue preparation method in enzyme histochemistry. What is the main advantage of this technique?** A) It allows for easy paraffin embedding. B) It rapidly fixes tissues using heat, improving sectioning quality. C) It removes water at low temperatures, helping to preserve enzyme activity and localization. D) It enhances the fluorescence of labeled antibodies.
14 Δ	**Acid phosphatase is a hydrolytic enzyme commonly used as a histochemical marker. For which cellular organelle is it a specific marker?** A) Mitochondria. B) Lysosomes. C) Plasma membrane. D) Nucleus.
15 •	**Which of the following tissue processing methods is generally NOT recommended for most enzyme histochemistry studies due to its detrimental effects on enzyme activity?** A) Cryostat sectioning of fresh-frozen tissue. B) Freeze-drying followed by resin embedding. C) Routine paraffin embedding involving heat and solvents.

	D) Fixation in cold formal-calcium.
16 Δ	**Osmium tetroxide (OsO_4) is a valuable reagent in lipid histochemistry. What visual change does it produce when it reacts with tissue lipids, and what does this indicate?** A) It produces a red color, indicating the presence of phospholipids. B) It produces a black/brown deposit, indicating the presence of unsaturated lipids. C) It produces a blue fluorescence under UV light, indicating cholesterol. D) It produces a clear, crystalline structure, indicating triglycerides.
17 ■	**In UV-Schiff method, what is the role of ultraviolet (UV) light in the first step of this method?** A) To fix the tissue by cross-linking proteins. B) To oxidize the double bonds in unsaturated lipids, generating aldehyde groups. C) To stain the lipids directly with a fluorescent dye. D) To polymerize the lipid droplets, making them insoluble.
18 Δ	**Mercury orange is a histochemical reagent that reacts with a specific functional group in proteins. Which group is this?** A) Sulfhydryl or thiol groups (SH). B) Aldehyde groups (CHO). C) Phosphate groups (PO_4). D) Hydroxyl groups (OH).
19 *	**Evaluate the following statements to determine which one provides an accurate and comprehensive description of the types of markers used in immunohistochemistry technique.** A) Only radioactive isotopes can be used as markers for detection. B) Markers are limited to fluorescent dyes like FITC. C) Both fluorochromes (for fluorescence microscopy) and enzymes (like HRP for light/EM) can be used as markers. D) Stains like hematoxylin and eosin are the primary markers used.
20 Δ	**Diaminobenzidine (DAB) is a chromogen commonly used in conjunction with which immunohistochemical labeling system?** A) Gold-labeled antibody methods for electron microscopy. B) Alkaline phosphatase methods using BCIP/NBT. C) Fluorescent antibody methods using FITC. D) Peroxidase-labeled antibody methods (e.g., HRP).
21 Δ	**Purine and pyrimidine are the two types of nitrogenous bases in nucleotides. Which of the following is a purine base found in both DNA and RNA?** A) Thymine. B) Cytosine. C) Uracil. D) Adenine.
22 ■	**The phosphate groups in the backbone of nucleic acids confer an important physical property. How does this property influence their staining with basic dyes?** A) The phosphate groups must first be hydrolyzed to bind dyes. B) The phosphate groups are neutral and do not interact with dyes. C) The positive charge of the phosphate groups repels basic dyes. D) The negative charge of the phosphate groups attracts positively charged basic dyes.
23 Δ	**What is the critical chemical used in the Feulgen reaction to hydrolyze DNA and expose aldehyde groups?** A) Strong periodic acid (HIO_4) at a specific molarity. B) Mild sulfuric acid (H_2SO_4) at a specific molarity. C) Strong acetic acid (CH_3COOH) at a specific molarity. D) Mild hydrochloric acid (HCl) at a specific molarity.
24 Δ	**The Diastase Periodic Acid-Schiff (DPAS) stain is specifically designed to identify and confirm the presence of which substance by using an enzymatic digestion step?**

19

	A) Neutral mucins in goblet cells. B) Glycogen in hepatocytes or muscle cells. C) Collagen fibers in connective tissues. D) DNA in cell nuclei.
25 ■	**A major application of enzyme histochemistry is to compare biochemical activities in different cell states. What is a primary comparison made using these techniques?** A) Comparing the size of normal and abnormal cells. B) Comparing the metabolic activity of normal cells with that of abnormal cells, such as tumor cells. C) Comparing the lipid content of different cell types. D) Comparing the genetic sequence of DNA in different tissues.
26 ●	**For an enzyme used as a histochemical reagent to yield reliable results, which of the following conditions is most critical to control during the procedure?** A) The color of the laboratory lights. B) The specific pH and temperature optimal for that enzyme's activity. C) The brand of microscope used for observation. D) The thickness of the coverslip.
27 Δ	**Transferases constitute a class of enzymes defined by their catalytic action. What is the general function of a transferase enzyme?** A) To transfer a functional group from one molecule to another. B) To catalyze oxidation-reduction reactions. C) To add water to break chemical bonds. D) To join two molecules using energy from ATP.
28 Δ	**Which of the following methods is specifically designed to detect the presence of arginine residues in tissue proteins?** A) Performic acid-Alcian blue method. B) Ninhydrin-Schiff reaction. C) Sagaguchi method. D) Mercury orange technique.
29 ■	**Autoradiography can be employed to visualize proteins in tissues when the protein of interest is rich in a particular amino acid. Which of the following is an example of this application?** A) Using tritiated thymidine to label DNA in dividing cells. B) Detecting collagen by incorporating radioactive proline due to its high proline content. C) Staining glycogen with radioactive glucose analogs. D) Localizing lipids using radioactive fatty acid precursors.
30 ■	**In the direct fluorescent antibody method, what is the correct sequence of labeling and detection?** A) A fluorescent substrate is applied, which is cleaved by an enzyme linked to the antibody. B) An unlabeled primary antibody binds the antigen, followed by a fluorescent secondary antibody. C) The tissue antigen is first labeled with a fluorochrome, then an antibody is applied. D) An antibody specific to the antigen is conjugated with a fluorochrome, then applied to the tissue section.
31 ■	**Why does RNA not produce a positive result (magenta color) in the standard Feulgen reaction procedure?** A) RNA is completely destroyed by the mild acid hydrolysis step. B) The ribose sugar in RNA is converted to products that do not contain reactive aldehyde groups under the reaction conditions. C) RNA is stained green by the methyl green in the Schiff's reagent. D) RNA is extracted from the tissue during the hydrolysis step.
32	**For the histochemical demonstration of lipids, which tissue preparation method is generally**

•	**NOT recommended because it can remove most lipids from the specimen?** **A)** Preparation of fresh frozen sections. **B)** Fixation in formal calcium. **C)** Embedding in paraffin wax. **D)** Freeze-drying (lyophilization).
33 Δ	**Glucose, a primary energy source for cells, is classified as which type of monosaccharide based on its number of carbon atoms?** **A)** A triose (3 carbons). **B)** A pentose (5 carbons). **C)** A hexose (6 carbons). **D)** A heptose (7 carbons).
34 ■	**In the "simultaneous coupling" method for enzyme demonstration, how are the primary reaction product (PRP) and the final reaction product (FRP) related in time?** **A)** A colored substrate is used, and the enzyme makes it insoluble, forming the FRP directly. **B)** The enzyme itself is directly stained with a metal ion. **C)** The PRP is formed first, and the FRP is produced in a separate, subsequent step. **D)** The formation of the PRP and its capture as a colored FRP occur in the same incubation medium at the same time.
35 Δ	**The metal precipitation technique is often used to demonstrate phosphatases. Which metal ions are commonly used to trap the released phosphate ions as an insoluble salt?** **A)** Calcium (Ca^{2+}) and Lead (Pb^{2+}). **B)** Sodium (Na^{+}) and Potassium (K^{+}). **C)** Iron (Fe^{3+}) and Copper (Cu^{2+}). **D)** Magnesium (Mg^{2+}) and Zinc (Zn^{2+}).

Q2: Choose the letter (T) if the statement is true, and write the letter (F) on the provided bubble sheet: *(15 marks, one mark for each)*

36 Δ	**Simple proteins include glycoproteins, which are formed by the combination of proteins with carbohydrates.**
37 ■	**In the direct fluorescent antibody method, the antigen in the tissue section is directly labeled with a fluorescent dye before antibody binding.**
38 •	**For lipid histochemistry, formalin is the recommended fixative because it preserves all lipid classes without extraction.**
39 Δ	**Polarizing microscopy is primarily used to identify crystalline structures such as cholesterol and cholesterol esters in tissue sections.**
40 Δ	**The acid hematin method is recommended for the histochemical demonstration of phospholipids, especially those located in mitochondria.**
41 Δ	**Autoradiography can demonstrate nucleic acid synthesis by incorporating radioactive precursors such as tritiated thymidine for DNA and tritiated uracil for RNA.**

42 ■	RNA reacts with Schiff's reagent in the Feulgen reaction because its ribose sugar is converted to aldehyde groups under mild acid hydrolysis.
43 ■	In the Periodic Acid-Schiff (PAS) stain, periodic acid oxidizes hydroxyl groups in carbohydrates to produce aldehydes that react with Schiff's reagent.
44 Δ	Alcian blue is a histochemical stain commonly used to demonstrate neutral polysaccharides such as glycogen in tissue sections.
45 ■	In enzyme histochemistry, the final reaction product must be either colored for light microscopy or opaque for electron microscopy to allow visualization.
46 ■	The self-colored substrate method uses a colorless, but soluble substrate that becomes colored and insoluble after enzyme action.
47 •	When enzymes are used as histochemical reagents, they must be highly pure to ensure specificity and avoid unwanted side reactions.
48 Δ	Nucleoproteins, which consist of proteins combined with nucleic acids, are classified as simple proteins.
49 ■	Basophilia, the affinity for basic dyes, is a highly specific method for RNA detection because RNA is the only cellular component that stains with basic dyes.
50 ◊	Post-incubation coupling in enzyme histochemistry helps avoid non-specific staining that can occur when tissues are exposed to diazonium salts for prolonged periods.

End of Exam

Best Wishes
Dr. Ahmad U. M. Mahmoud

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology & Entomology Department	Program: Zoology Level: (3) Date: 12/1/2026 Time: 2 h	
Course Title: Microtechniques		Code: 317 Z	
Instructors: Prof. Dr. Mona M. Atia and Dr. Ahmad U. M. Mahmoud			
Important: -	No. of pages 7	No. Of questions 5	Total Mark:50 degree

I: Choose the correct answer from "A, B, C, or D", then put your answer inside the empty box, under the black arrow: *(40 marks, one mark for each)*

1 Δ	**The most abundant class of gamma globulins in serum is:** **A)** IgA. **B)** IgM. **C)** IgG. **D)** IgE.	
2 Δ	**ABC method stands for:** **A)** Antibody-Biotin Chromogen. **B)** Antigen-Binding Complex. **C)** Avidin-Biotin Complex. **D)** Alkaline-Biotin Compound.	
3 ■	**The purpose of antigen retrieval is to:** **A)** Decrease antibody accessibility. **B)** Remove all antigens. **C)** Increase the accessibility of antibody to bind antigen. **D)** Fix the tissue further.	
4 Δ	**Skimmed milk powder is used for:** **A)** Tissue fixation. **B)** Protein blocking. **C)** Antigen retrieval. **D)** Chromogen development.	
5 ■	**A labeled anti-immunoglobulin antibody (secondary antibody) recognizes:** **A)** The antigen directly. **B)** The specifically reacting primary antibody. **C)** The tissue section. **D)** The chromogen.	
6 ■	**In the polymerization of acrylamide gels, what are the specific roles of APS and TEMED?** **A)** APS is the catalyst; TEMED is the initiator. **B)** APS is the polymerization initiator; TEMED is the polymerization catalyst. **C)** Both are cross-linking agents. **D)** APS provides monomers; TEMED forms cross-links.	
7 ■	**The separating gel is described as providing "good resolution for low M.W protein." Why is this specification important?** **A)** High molecular weight proteins cannot enter the separating gel. **B)** The 10% concentration and small pores effectively discriminate between similar-sized small proteins. **C)** Low molecular weight proteins are positively charged. **D)** The pH 8.8 only affects small proteins.	
8 ■	**In the three-step free radical polymerization (Initiation, Propagation, Termination), what specifically occurs during the propagation phase?**	

CA

	A) Successive addition of monomers to growing polymer chains. B) APS breaks down to form free radicals. C) Cross-linking agents terminate the reaction. D) The gel solidifies completely.	
9 ■	**Why is bromophenol blue included in the sample buffer rather than just relying on protein visualization after staining?** A) It allows real-time monitoring of electrophoresis progress before protein staining. B) It denatures proteins. C) It increases protein negative charge. D) It polymerizes the gel.	
10 ■	**The document states proteins migrate "at a rate proportional to their linear size" after SDS treatment. Why is this proportional relationship possible?** A) SDS binds at a constant ratio to protein mass form charge density. B) The gel pores are all the same size. C) All proteins have identical amino acid sequences. D) Temperature controls migration rate.	
11 Δ	**What is the MAIN reason for using different pH values in running gel versus stacking gel?** A) To create different pore sizes for protein separation. B) To prevent SDS from binding to proteins. C) To denature proteins at different rates. D) To enhance antibody binding efficiency.	
12 Δ	**What is the CRITICAL difference between running buffer and transfer buffer composition?** A) Transfer buffer contains methanol while running buffer does not. B) Running buffer contains Tris base only. C) Running buffer has higher SDS concentration. D) Transfer buffer has lower glycine content.	
13 •	**PVDF membrane is preferred over nitrocellulose when:** A) Working with low molecular weight proteins. B) The blot needs to be stripped and reprobed multiple times. C) Maximum protein binding capacity is needed. D) Cost reduction is the primary concern.	
14 ■	**In chemiluminescent detection using ECL, luminol reacts with HRP and H_2O_2 to:** A) Produce a colored precipitate. B) Create radioactive signals. C) Emit light that can be detected on X-ray film. D) Generate fluorescent proteins.	
15 •	**The nitrocellulose membrane is described as "brittle" which means:** A) It has poor protein binding capacity. B) It cannot be used with chemiluminescent detection. C) It requires higher voltage during transfer. D) It is mechanically fragile and less suitable for reprobing.	
16 ■	**Which statement about aneuploid cells is correct?** A) They have exactly 46 chromosomes. B) They represent exact multiples of the haploid number. C) They have an abnormal number of chromosomes. D) They are always diploid.	
17 Δ	**Which transcription factors maintain embryonic stem cell pluripotency?** A) Those expressed on the cell membrane.	

	B) Those expressed in the cytoplasm only. C) Those expressed on the cell surface. D) Those expressed in the mitochondria.	
18 •	**Which characteristic is LOST when primary cultures become continuous cell lines?** A) Ability to divide. B) Contact inhibition. C) Anchorage dependence. D) Metabolic activity.	
19 ■	**What happens when cells in culture reach confluence without subculturing?** A) They grow faster. B) Growth slows and contamination risk increases. C) They automatically detach. D) They become immortalized.	
20 ■	**What is the purpose of adding warm culture medium after collagenase digestion? To…….** A) increase digestion speed. B) inhibit enzymatic activity. C) activate stem cells. D) kill bacteria.	
21 Δ	**Identify who is credited with making significant early microscopic observations of tissues in the late 17th century.** A) Marcello Malpighi. B) Robert Hooke. C) Anton van Leeuwenhoek. D) Louis Pasteur.	
22 ■	**Explain why electron microscopes have higher resolution than light microscopes.** A) They use stronger glass lenses. B) They use visible light with a longer wavelength. C) They use electron beams with a shorter wavelength. D) They require simpler sample preparation.	
23 •	**Determine which type of microscopes would be most appropriate for observing live cells in a culture dish.** A) Stereo Microscope. B) Inverted Light Microscope. C) Scanning Electron Microscope (SEM). D) Transmission Electron Microscope (TEM).	
24 ◊	**Analyze the following scenario: A researcher needs to study both the surface morphology of intestinal villi and the internal ultrastructure of mitochondria within epithelial cells in a mouse model. Which combination of microscopes would provide the most comprehensive analysis?** A) Brightfield microscope and phase-contrast microscope. B) Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). C) Confocal microscope and stereo microscope. D) Simple microscope and compound microscope.	
25 Δ	**Recall which surgical tool is described as a sharp, precise cutting tool for making incisions with minimal tissue damage.** A) Forceps. B) Scissors. C) Needle Holder.	

c9

	D) Scalpel.	
26 ■	**Explain why formalin is the most commonly used fixative despite its limitations.** A) It is the cheapest fixative available. B) It causes no tissue shrinkage or hardening. C) It penetrates tissue rapidly and preserves antigenicity well. D) It is completely non-toxic and safe to handle.	
27 •	**Determine the most appropriate fixative for a study requiring both routine histology and subsequent immunohistochemistry.** A) 10% neutral buffered formalin (NBF). B) Glutaraldehyde. C) Ethanol. D) Osmium tetroxide.	
28 ◊	**Analyze this troubleshooting scenario: During routine histological processing, cleared liver tissue samples exhibit a cloudy appearance in xylene and produce wax blocks that yield soft, mushy sections that crumble during microtomy. Which combination of factors most likely explains both the cloudy xylene and the mushy, poorly infiltrated sections?** A) Over-dehydration and incomplete clearing. B) Proper dehydration but prolonged exposure to fresh xylene. C) Insufficient wax impregnation time despite correct dehydration and clearing. D) Inadequate dehydration and water-contaminated xylene.	
29 O	**Design a FIXATION protocol for a delicate embryonic tissue sample that must be analyzed by both light and electron microscopy.** A) 10% formalin for 24h → Dehydration → Embedding. B) Glutaraldehyde-paraformaldehyde mixture → Post-fixation with osmium tetroxide → Dehydration. C) Ethanol overnight → Xylene → Paraffin embedding. D) Freeze immediately in liquid nitrogen → Cryosectioning.	
30 Δ	**Identify the correct order of steps in tissue processing.** A) Dehydration, Fixation, Clearing, Infiltration, Embedding. B) Fixation, Dehydration, Infiltration, Clearing, Embedding. C) Fixation, Dehydration, Clearing, Infiltration, Embedding. D) Clearing, Dehydration, Fixation, Embedding, Infiltration.	
31 ■	**Explain why ascending grades of alcohol are used during dehydration rather than starting with 100% alcohol.** A) 100% alcohol is too expensive for initial dehydration. B) Lower grades of alcohol work faster than higher grades. C) Ascending grades are only used for certain tissue types. D) Gradual dehydration minimizes tissue shrinkage and distortion.	
32 ◊	**Analyze this problem: Paraffin sections of skeletal muscle tissue crumble and fragment during microtomy, and the resulting stained sections appear brittle with uneven, patchy staining in different tissue regions. Which combination of processing errors most likely explains both the sectioning difficulty and the uneven staining pattern?** A) Over-dehydration and incomplete wax infiltration. B) Under-dehydration and over-clearing. C) Proper dehydration but incorrect embedding orientation. D) Correct processing but dull microtome blade.	
33 O	**Design a tissue processing protocol for a large, dense tissue sample (e.g., bone) that MINIMIZES processing time while maintaining histological quality for subsequent**	

	analysis. Which approach represents the most effective and balanced protocol for this type of sample? **A)** Standard processing times for all steps. **B)** Extended dehydration and clearing times with standard infiltration. **C)** Microwave-assisted processing with monitored time and temperature adjustments. **D)** Skip the clearing step and proceed directly from dehydration to infiltration.	
34 Δ	**State which type of microtome is most common for routine paraffin-embedded sections.** **A)** Cryostat. **B)** Vibratome. **C)** Rotary Microtome. **D)** Ultramicrotome.	
35 •	**Select the appropriate sectioning method for intraoperative diagnosis requiring rapid results.** **A)** Paraffin sectioning with rotary microtome. **B)** Frozen sectioning with cryostat. **C)** Resin embedding with ultramicrotome. **D)** Whole mount preparation.	
36 •	**Determine the most appropriate microtome type for obtaining a 50 nm thick section of liver tissue for viewing mitochondrial cristae.** **A)** Rotary microtome. **B)** Cryostat. **C)** Vibratome. **D)** Ultramicrotome.	
37 ◊	**Analyze the following lab result: After H&E staining, a kidney tissue section shows excellent nuclear detail but very pale and barely visible cytoplasmic staining. Which step in the staining protocol was most likely mishandled?** **A)** Inadequate hematoxylin staining time. **B)** Inadequate eosin staining time or pH imbalance. **C)** Insufficient dehydration before mounting. **D)** Over-fixation in formalin.	
38 *	**Evaluate this laboratory policy: "To ensure consistency, all tissue samples must be fixed in 10% formalin for exactly 48 hours, regardless of tissue type or size". What is the most critical defect in this policy?** **A)** Formalin is not a suitable fixative for all tissues. **B)** 48 hours is insufficient for proper fixation of any tissue. **C)** All tissues should be fixed for at least 72 hours. **D)** Fixation time should be adjusted based on tissue size, density, and type to avoid under- or over-fixation.	
39 Δ	**State the primary chemical action by which formalin acts as a fixative.** **A)** Forms methylene bridges between protein amino groups. **B)** Precipitates cellular proteins. **C)** Denatures proteins by disrupting hydrogen bonds. **D)** Dissolves membrane lipids.	
40 ■	**Describe the main consequence of inadequate clearing during tissue processing.** **A)** Prevents proper wax infiltration, leading to soft and mushy blocks. **B)** Improves wax infiltration and sectioning quality. **C)** Causes excessive tissue hardening and brittleness. **D)** Has no effect on subsequent steps.	

II- Define the following terms: Choose any <u>three out of the five</u> options provided. *(3 marks, one mark for each)* Δ■

SDS (sodium dodecyl sulfate), Avidity of Antibody, Western blot, Totipotent, and Cell culture

III- Answer the following with details only <u>one out of the two</u> options provided. *(2 marks)*

1- **What is the Difference Between Stacking Gel and Separating Gel in Electrophoresis?** ■*

2- **Write about Classification of stem cells according origin.** Δ■

IV- Define the following terms. (Choose any <u>three of the five</u> options provided). *(3 marks, one mark for each).* **(Δ ■)**

(Tissue Sampling – Cryostat – Compound Fixative [with two examples] – Dehydration - Vibratome)

V- Answer the following in detail. (Choose <u>only one of the two</u> options provided). *(2 marks)*

A. Compare the mechanisms of action, advantages, and primary applications of formaldehyde and glutaraldehyde as fixatives. (◊ *)

B. Analyze the advantages and disadvantages of xylene and chloroform as clearing agents and explain under what circumstances each would be preferred. (◊ *)

End of Exam

Best Wishes
Prof. Dr. Mona M. Atia & Dr. Ahmad U. M. Mahmoud

Δ Remember ■Understand •Apply ◊Analysis *Evaluate ◯Create

	Assiut University- Faculty of Science Frist Semester- Final Exam 2026 Zoology and entomology Department	Program: zoology Level : (3) Date: 22/1/2026 Time: 2 h	
Course Title: vertebrate 2			Code: 330-Z
Instructors: Prof. Dr. Fatma A Mahmoud			
Important:	No. of pages 6	No. Of questions 3	Total Mark: 50 degree

Question I: choose the correct answer

(20 marks) (Δ , ■)

1- Which of the following have same the structure of bird's stomach?

a) Crocodiles b) lizard c) snake

2- There were ..... major lineages arise of the amniotes radiation

a) three b) one c) two

3- Choose the answer below that correctly matches the ratites with its structural characteristics

a) Flightless bird, have reduce wing, paired temporal fenestrae and breathing by help air sacs

b) Diving bird, have reduce wing, paired temporal fenestrae and breathing by help air sacs

c) Reptiles, lack temporal fenestrae and breathing by help the diaphragmaticus muscle

4- Which of the following have dikinetic skull and forked tongue?

a) Amphisbaenians b) Lizards c) Snakes

5- The.....have responsive to seismic and airborne sounds due to absent.....

a) Snake- tympanum b) Snake- columella c) Gecko- external meatus

6- Tetrapod face the force gravity by development of .....

a) Limb b) cervical vertebrae c) sternum

7- Which of the following parts of the genital system is responsible for adding the shell to eggs?

a) ovary b) oviduct c) uterus

8- Which of the following features not apply to mammals?

a) Lack temporal fenestrae and breathing diaphragm action

b) Endothermic and have one temporal fenestrae

c) Endothermic, have developed sternum, and pair of test

9- Left ovary functional in most species of ..... while the right ovary regresses in embryos

a) Reptiles b) Mammals c) Birds

10- ..... consisting of all birds lack keels and cannot fly

a) Ratites b) Raptors c) Dove

11- Which one of the following is not a rule while classification of the type of skull?

a) The position of the temporal bar

b) The number of the fenestra.

c) None of above

Δ Remember ■Understand •Apply ◊Analysis *Evaluate ◯Create

12- Which of the following features apply to snakes?

a) Lack temporal fenestrae and quadrate bone is immovable

b) Endothermic and have pair temporal fenestrae

c) Ectothermic, lack sternum, and movable quadrate

13- The muscularized ……. is the principal component in …….. lung ventilation

a) Diaphragm- crocodiles

b) Diaphragmatic – Snake

c) Diaphragm- mammalian

14- Which of the following is belonging to Lepidosauromorpha?

a) Snakes b) Allies c) (a&b)

15- Synapsidian skull posses

a) An upper temporal fossa

b) An upper and lower temporal fossae

c) A lower temporal fossa

16- What do we call the group of animals have strong postorbital ligament extends from behind the eye to the lower jaw?

a) Mammals b) Birds c) Reptiles

17- Which of the following is not a characteristic of an organism belonging to the Phylum chordates?

a) Deuterostomes

b) Body Dorsoventrally Flattened

c) True Coelom

18- Head rotation allows by

a) A cervical muscular system

b) Development of anterior cervical vertebrae

c) Development of the neck region

19- The ……is lost in some modern reptiles

a) Clavicle b) Interclavicle c) Scapula

20- During the ……inhalation in bird, air directly to the lungs, and the rest fills the …….. air sacs

a) Second- anterior b) First- posterior c) First- anterior

<u>Question II: Choose whether the statement is true or false and correct it:</u> (20 marks) (Δ, ■)

1- When reptiles using a cardiac shunt, returning blood to the right side of the heart instead goes directly to the left side and departs for systemic tissues.

2- In birds, fusion of elements in the hindlimb produces a composite bone (the cannon bone).

3- The ventricle in reptiles has two interconnected compartments internally: the cavum venosum and cavum arteriosum.

4- Air frequency transmit to the mechanoreceptor in mammals by external and middle ear.

5- Snakes skull have both upper and lower temporal bars.

6- The mammals arose within the therapsid radiation.

7- In reptiles, the vomeronasal organ is a separate pit to which the tongue and oral membranes deliver chemicals.

8- The anterior part of the secondary palate is the soft palate.

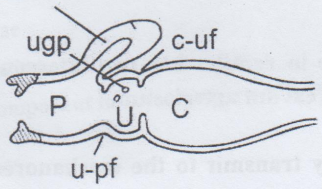
9- Only mammals have thecodont teeth sunken into sockets within the bone.

10-The Archaeopteryx is considered as the reptilian fossils that might further narrow the gap between birds and mammals.

Question III: Choose the correct definition of the following pictures. (10 marks) (Δ , ■)

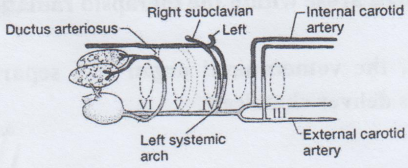
1)

a) Cloaca of reptiles
b) Cloaca of birds
c) Cloaca of mammals



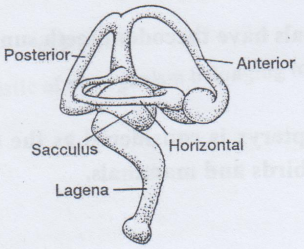
2)

a) Aortic arches of avian
b) Aortic arches of reptilian
c) Aortic arches of mammalian



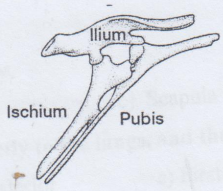
3)

a) vestibular apparatus of ostrich
b) vestibular apparatus of kangaroo
c) vestibular apparatus of crocodile



4)

a) pelvic girdle of dinosaur
b) pelvic girdle of female human
c) Pelvic girdle of male human



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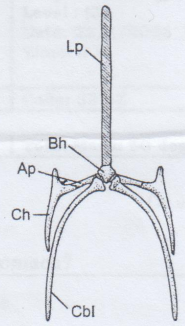
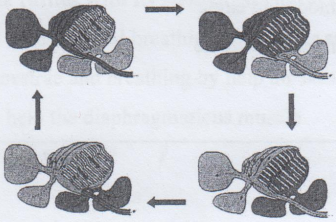
5)

a) Hyoid apparatus of the chameleon
b) Hyoid apparatus of the pigeon
c) Hyoid apparatus of the bat



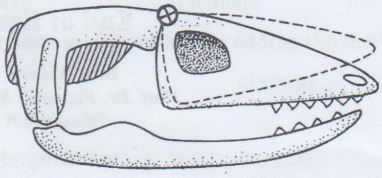
6)

a) Airflow patterns during snake breathing
b) Airflow patterns during bird breathing
c) Airflow patterns during lizard breathing



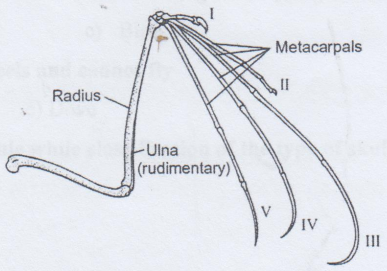
7)

a) mesokinesis in amphisbaenians
b) Prokinesis in snakes
c) mesokinesis in crocodiles



8)

a) wing of Pterosaur
b) wing of bird
c) wing of bat



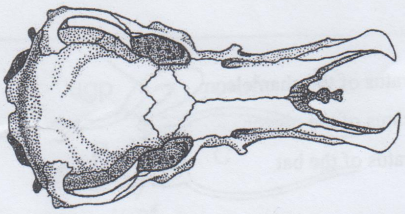
12

9)

a) skull of platypus

b) skull of dog

c) skull of duck

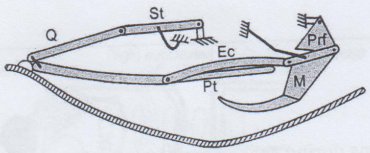


10)

a) Kinematic model in bird

b) Kinematic model in eagle

c) Kinematic model in snake



End of Exam

Best Wishes

Prof. Dr. Fatma A. Mahmoud

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	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology and Entomology Department	Program: Zoology/ Chem. Zoology Level : (3) Date: 21/1/2026 Time: 2 h	
Course Title: Parasitology			Code: 321Z
Instructors: Prof. Dr. Gamal H. Abed; Dr. Sara Salah Abdel-Hakeem			
Important:	No. of pages 2	No. Of questions 4	Total Mark: 50 degree

A- Choose the correct answer for each of the following (one mark/ each)

1. Two hosts are required in

(a) *Plasmodium* spp. (b) *Enterobius vermicularis*

(c) *Giardia* sp. (d) *Trichomonas hominis*

2. Infective stage of *Heterophyes heterophyes* is encysted in

(a) Grasses (b) Snails

(c) Sheep (d) Fish

3. Amoebic meningitis is a disease can be caused by

(a) *Entamoeba histolytica* (b) *Naeglaria fowleria*

(c) *Entamoeba gingivalis* (d) *Entamoeba coli*

4. Which one of the following can be called "Incidental Parasite?"

(a) *Diphyllobothrium latum* (b) *Dipylidium caninum*

(b) *Fasciola hapatica* (d) *Clonorchis sinesis*

5. The infective form of the malaria parasite is

(a) Oocyst (b) Sporozoites

(c) Tachyzoites (d) Bradyzoites

6. The infective stage of *Ancylostoma duodenale* is

(a) Rabdtoid larva (b) Embryonated egg

(c) Filariform larva (d) Microfilaria

7. Human acts as intermediate host of

(a) *Taenia solium* (b) *Hymenolypis nana*

(c) *Echinococcus granulosus* (d) *Fasciolepsis buski*

8. All the following are intercellular parasites except

(a) *Plasmodium* (b) *Trichomonas vaginalis*

(c) *Lieshmania* (d) None of the above

9. The second intermediate host of *Diphylobothrium latum* is

(a) Fish (b) Pigs

(c) Cyclops (d) Snails

10. The diagnostic stage of *Schistosoma haematobium* is

(a) Egg in urine (b) Egg in feces

(c) Forked tail cercaria in water (d) metacercaria

11. All the following parasites can be transmitted through raw meat except

(a) *Echinococcus granulosus* (b) *Taenia saginata*

(c) *Dipylidium caninum* (d) *Clonorchis sinesis*

12. Amastigotes in *Leishmania* sp. are present in

(a) WBCs (b) RBCs

(c) Plasma (d) Lymph nodes

13. The ootype in trematoda connect with

(a) Oviduct (b) Vitelline canal

(c) Uterus (d) all of the above

14. Consumption of uncooked fish is likely to cause which of the following helminthic disease

(a) *Diphyllobothrium latum* (b) *Taenia saginate*

(c) *Fasciola hepatic*a (d) *Echinococcus granulosus*

15. Which of the following is viviparous?

(a) *Diphyllobothrium latum* (b) *Echinococcus granulosus*

(c) *Wuchereria bancrofti* (d) *Schistosoma haematobium*

16. Sputum swab is used to diagnose

(a) *Asacaris lumbercoides* (b) *Enterobius vermicularis*

(c) *Wuchereria bancrofti* (d) *Schistosoma haematobium*

17. All the following lead to bloody diarrhea except

(a) *Schistosoma mansoni* (b) *Entamoeba histolytica*

(c) *Schistosoma haematobium* (d) *Trypanosoma* spp.

18. What cestode has an operculated egg similar to the trematodes?

(a) *Diphyllobothrium latum* (b) *Echinococcus granulosus*

(c) *Taenia saginata* (d) *Fasciola hapatica*

19. Which one of the following is a good general statement about the life cycle of digenetic trematodes?

(a) A snail intermediate host is required

(b) The infective (metacercarial) stage always encysts on aquatic vegetation

(c) The adult fluke is always found in the small intestine of the definitive host.

(d) All life cycles contain redia stage

20. Which one of the following is a good general statement about the life cycle of cestodes?

(a) A snail intermediate host is required.

(b) The infective larval stage must be ingested: either via the predator / prey interaction or due to accidental ingestion of the intermediate host.

(c) There is always an aquatic larval stage, such as the coracidium.

(d) Cestodes always require 3 hosts to complete their life cycles.

B- Compare with labelled diagram between: (12 marks)

- ***Taenia saginata* and *Taenia solium* in regards (scolex, gravid proglottids, infective stage, and intermediate stage)?**
- **Microfilaria of *Wuchereria bancrofti*, loa loa, and *Onchocerca volvulus***
- ***Schistosoma haematobium* and *Schistosoma mansoni* in regards (habitat, egg, diagnostic stage, and intermediate stage)?**

D- Give an account with labelled diagram on vegetables as a source of protozoan infection? (10 marks)

E- Discuss with labelled diagram the life cycle of *Leishmania* spp.? (8 marks)

Best Wishes.....Prof. Dr. Gamal H. Abed; Dr. Sara S. Abdel-Hakeem

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