
	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology & Entomology Department	Program: Zoology Level : (4) Date: 22/1/2026 Time: 2 h	
Course Title: Developmental Biology		Code: Z 437	
Instructors: Prof. Dr. Reda A. Ali			
Important:	No. of pages: 1	No. Of questions: 5	Total Marks: 50



Answer the following questions using illustrations when it is possible:

- 1- Explain in details the role of **BMP** gene in the development of **only three** organs of the following: **Kidney – Heart – Eye – Limbs**. (10 marks)
- 2- Answer only **Two** parts:
  - A) What is the relationship between FSH, LH, Sertoli cells and Leydig cells? (5 marks)
  - B) Explain the process of morphogenesis and the fate neural crest cells. (5 marks)
  - C) Write short notes on gastrulation and how it is affected by the amount of yolk. (5 marks)
- 3- Describe **three** artificial reproductive technologies and its medical and economic importance. (10 marks)
- 4- A) Describe the significance and details of cortical granule reaction. (5 marks)  
B) Write notes on sperm capacitation. (5 marks)
- 5- A) Choose the right answer: (one mark each)
  - 1- Speract molecule is a  
a) sperm activator      b) chemotactic      c) short peptide      d) all of them
  - 2- Cleavage includes many mitotic divisions resulting in all of the following except  
a) cell number increase      b) cell size decrease      c) morula formation      d) grey crescent
  - 3- Pronephros is not functional in all of the following embryos except  
a) human      b) chick      c) mice      d) frog
  - 4- Iris originates from  
a) ecto & mesoderm      b) ecto & endoderm      c) meso & endoderm      d) all of them
  - 5- Pattern formation of the nervous system is influenced by a chemical signal of  
a) Retinoic acid      b) Vitamin E      c) both      d) none
- B) Clarify the role of Wnt inhibitors in the development of external genitalia. (5 marks)

**End of Exam**

Best Wishes Prof. Dr. Reda A. Ali

△ Remember    ■ Understand    ● Apply    ◇ Analysis    \* Evaluate    ○ Create

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology and entomology Department	Program: zoology Level : (3) Date: 5/1/2026 Time: 2 h	
Course Title: vertebrate taxonomy		Code: 433-Z	
Instructors: Prof. Dr. Fatma A Mahmoud			
Important:	No. of pages 5	No. Of questions 2	Total Mark:50 degree

**Question I: choose the correct answer**

(Δ , ■)

- 1- If two organisms are in the same order, they must also be in the same.....  
a) Class                      b) Species                      c) Kingdom
- 2- ..... is eel-like, scavengers and feed on dead fish, as well as, it can knot their bodies to escape capture or give them force to tear off food  
a) Agnathans              b) Myxinoidea              c) Petromyzontida
- 3- What was Darwin classification system based on?  
a) their geographic origin  
b) their similarities and differences  
c) their phylogenetic relationships
- 4- the organisms which descended from more than one ancestor, are considered..... group  
a) monophyletic              b) Paraphyletic              c) Polyphyletic
- 5- Which of the following is NOT chondrichthyans?  
a) Bowfins                      b) sharks                      c) chimaeras
- 6- Which pair of taxonomic terms or ranks are requirements for constructing bionomenclature of taxa ?  
a) Class and phylum              b) family and subfamily              c) Genus and Species
- 7- Which of the following their eggs are fertilized internally within the reproductive tract?  
a) Proanura                      b) Urodela                      c) Anura
- 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- Which level of classification could contain all eukaryotic organisms?  
a) Domain                      b) Kingdom                      c) Species
- 10- ..... is characterized by a single pair of continuously growing incisors in each jaws and that contains the pocket gophers.  
a) Macropodinae              b) Geomyoidea              c) Rodentia

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- 11- The sarcopterygians were known once as.....
- a) Choanichthyes                      b) Chondrichthyans                      c) None of them
- 12- ..... consisting of all birds lack keels and cannot fly
- a) Ratites                      b) Raptors                      c) Dove
- 13- Which one of the following is not a rule while writing the name of an organism, according to the principles of biological nomenclature?
- a) The name of the phylum should begin with a capital letter  
b) The name of the class should be italicized.  
c) The name of the species should begin with a small letter and italicized
- 14- 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
- 15- Which of the following is a unique characteristic that distinguishes a spiny anteaters from other mammals?
- a) have hair, suckle their young, and are endotherms  
b) lack nipples, lack external ears, and embryos develop in shelled eggs  
c) all of above
- 16- Which of the following group do not use claspers, though some species use their anal fins as gonopodium for the same purpose?
- a) Bony fish                      b) Shark                      c) All fish
- 17- Which of the following is not a characteristic of an organism belonging to the holocephalans ?
- a) Conical snout with saw-like teeth  
b) Have six gill slits  
c) All of above
- 18- Which of the following is a unique characteristic that distinguishes a columbiformes from other birds?
- a) Sharp claws  
b) Small size  
c) Presence of crop
- 19- What do we call the group of animals with a gastrilia?
- a) Mammals                      b) Birds                      c) Reptiles

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

21- Placoderms are considered a ..... taxa

- a) Polyphyletic
- b) Monophyletic
- c) Paraphyletic

22- Organisms in the Kingdom Animalia are.....

- a) Multicellular and heterotrophic
- b) Multicellular and autotrophic
- c) Unicellular and heterotrophic

23- When all organisms in a lineage plus the ancestor they have in common, this is an example of a

- a) clade
- b) sister group
- c) grade

24- .....are birds with talons, specialized feet used to stun or grasp prey.

- a) Emus
- b) Hawks
- c) antbirds

25- Some fish biologists divide actinopterygians into

- a) Chondrosteans and holosteans
- b) Only teleosts
- c) Both a& b

**Question II: Choose whether the statement is true or false and correct it: (Δ, ■)**

1- A taxon is simply a named group of organisms, can be distinguished into three types of taxa.

2- Both echinoderms and chordates are deuterostomes, share in cleavage, mesodermal, coelomic and the mode of feeding.

3- Lepidosauria including modern snakes, lizards, Sphenodon.

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- 4- Vertebrate evolution was based on certain embryonic features like the presence of neural crest cells and epidermal placodes found only in vertebrates.
- 5- all lizards have movable eyelids and an external auditory meatus but snakes lack both structures.
- 6- Living lampreys are the only living vertebrate whose ancestors never lived in fresh water.
- 7- The heterocercal tails of teleostomi provide lifting power that helps it maintain its place within the vertical water column.
- 8- Monophyletic taxon is defined as one that includes the most recent common ancestor of a group of organisms.
- 9- Chimaeras differ from sharks in that the upper jaws of chimaeras are firmly fused to the braincase.
- 10- Most taxonomists treat all living amphibians as members of the Lissamphibia which arose within the Lepospondyls radiation.
- 11- Acanthodii : a reference to rows of bones along the top and sides of the body.
- 12- all amphibian lacks scales which allows respiration to occur through the moist skin
- 13- lampreys exhibit the latent capacity to calcify their endoskeleton.
- 14- Modern lungfishes lack cosmine, have a skeleton composed mostly of cartilage, and exhibit a prominent notochord.
- 15- Rays are placed in one family, the Rajidae but Most skates are placed in several different families.
- 16- Frogs and toads make up the Salientia.

-The only surviving members of Parareptilia are turtles, in which the eardrum is supported by quadrate.

18-a clade describe the closest relatives of an organism in phylogenetic tree.

19- Ostrich laying the largest eggs of any living land animal.

20-Geckos are unique among reptiles for their vocalisations and lack of eyelids.

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

22-The segmentation and jointed appendages of arthropods are like the chordate myotomal segmentation.



23-Pheasants have long elliptical wings for maneuverability.

24-Tubulidentata have a large, fusiform body with heavy bones that act as ballast to counteract the buoyancy of their blubber.

25-Primates includes the strepsirrhines, which include lemurs, galagos, and tarsiers.

**End of Exam**

Best Wishes  
*Prof. Dr. Fatma A. Mahmoud*

	Assiut University- Faculty of Science Frist Semester- Final Exam 2025-2026 Zoology & Entomology Department	Program: Zoology Level : (4) Date: 23/1/2026 Time: 2 h	
Course Title:	Experimental Embryology	Code: 438 Z	
Instructors:	Prof. Dr. Mona M. Atia		
Important: -	No. of pages 6	No. Of questions 2	Total Mark:50 degree

I: Choose the best single correct answer from "A, B, C, or D", (40 marks, one mark for each)

- Adult muscle stem cells are classified as: △  
 A) Totipotent                      B) Pluripotent                      C) Multipotent                      D) Unipotent
- The term "stemness" refers to: △  
 A) Cell death                      B) Cell differentiation                      C) Cell migration                      D) Maintaining stem cell characteristics
- The anti-inflammatory properties of AD-MSCs help reduce: △  
 A) Only local inflammation                      B) Only acute inflammation  
 C) Only systemic inflammation                      D) Inflammation and neurodegeneration
- Stem cells can migrate and home from their original place, this ability is called: ■  
 A) Differentiation                      B) Self-renewal                      C) Specialization                      D) Relocation
- The cells that develop into specialized cells of the human body are: ■  
 A) Progenitor cells                      B) Stem cells                      C) Differentiated cells                      D) Somatic cells
- The Latin phrase "Ex ovo omnia" means: ■  
 A) Life from life                      B) All from eggs                      C) Cells from cells                      D) Growth through stages
- Marcello Malpighi is known for: ■  
 A) Discovering DNA                      B) Using early microscopes to study chick embryos  
 C) Proposing evolution theory                      D) Discovering mammalian ovum
- Modern molecular embryology uses which technique? ■•  
 A) Simple light microscopy only                      B) Gene editing and molecular imaging  
 C) Dissection only                      D) Behavioral observation
- Who is considered the true founder of modern embryology? ■  
 A) Aristotle                      B) William Harvey                      C) Karl Ernst von Baer                      D) Marcello Malpighi
- What animal did Aristotle primarily study for embryology? ■•  
 A) Frogs                      B) Fish                      C) Chicken embryos                      D) Mammals
- Which area of embryology helps understand congenital malformations? ■  
 A) Only fossil studies                      B) Only comparative embryology                      C) All areas of embryology                      D) Only adult anatomy
- Cell determination and differentiation concepts were demonstrated in: △  
 A) Ancient embryology                      B) Preformation theory                      C) Experimental embryology                      D) Comparative anatomy

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13. Which of the following is NOT a type of non-biological teratogen?  
 A) Viral agents B) Chemical agents C) Physical agents D) Nutritional imbalances
14. The main teratogenic period starts from:  
 A) Formation of germ layers up to organogenesis B) Fertilization to implantation  
 C) After birth D) During the third trimester only
15. The defective immunity hypothesis suggests cancer develops when:  
 A) The immune system fails to block tumor development B) Too many lymphocytes are present  
 C) Viruses are absent D) Metabolism increases
16. Teratomas can be classified on the basis of:  
 A) Gross appearance only B) Histological appearance only  
 C) Degree of differentiation only D) All of the above
17. Which is NOT mentioned as a cure/treatment for cancer?  
 A) Chemotherapy B) Radiation C) Surgery D) Antibiotics
18. The somatic mutation hypothesis states that cancer results from:  
 A) Viral infection only B) Environmental factors only  
 C) Inherited genetic defects only D) Somatic mutation without viral infection
19. Sarcomas begin in:  
 A) Skin or epithelial tissues B) Blood-forming tissues C) Immune system cells D) Connective or supportive tissue
20. In diploid parthenogenesis, what develops from a diploid egg?  
 A) Female B) Male C) Worker bees D) Spores
21. *Artemia salina* females are an example of:  
 A) Diploid parthenogenesis B) Haploid parthenogenesis  
 C) Incomplete parthenogenesis D) Artificial parthenogenesis
22. Classification based on chromosome number divides parthenogenesis into:  
 A) Haploid and diploid types B) Complete and incomplete types  
 C) Natural and artificial types D) Male and female types
23. Which of the following can induce artificial parthenogenesis through mechanical means?  
 A) Temperature B) Sea water C) Acids D) Salts
24. Natural parthenogenesis occurs:  
 A) Spontaneously in nature B) Only with chemical induction  
 C) Only in laboratory conditions D) Through mechanical stimulation
25. Which statement about complete parthenogenesis is correct?  
 A) Reproduction occurs only by parthenogenesis B) Males are rare but present  
 C) It alternates with sexual reproduction D) It requires fertilization occasionally
26. The classification of parthenogenesis based on mode of occurrence includes:  
 A) Natural and artificial B) Haploid and diploid C) Complete and incomplete D) Male and female

△ Remember

■ Understand

● Apply

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○ Create

27. What is the main characteristic of primary larvae? ■  
 A) Similar to adult body plan B) Very different from adult form  
 C) No metamorphosis required D) Only found in reptiles
28. Which hormone is primarily responsible for amphibian metamorphosis? ■  
 A) Growth hormone B) Thyroxine (T4) C) Insulin D) Testosterone
29. What role does T3 play in limb development? ■  
 A) It prevents limb formation B) It helps neurons grow and connect to limb muscles  
 C) It causes limb resorption D) It has no effect on limbs
30. Which organs undergo remodeling during metamorphosis? ■  
 A) Only the intestine B) Skull, nervous system, and intestine C) Only the skull D) Only external structures
31. What is biochemical respecification? ■  
 A) Cell death process B) Cells producing new proteins C) Tissue remodeling D) Limb growth
32. When does TR $\beta$  receptor activate?  $\Delta$   
 A) Before hatching B) Early in development C) Later during metamorphosis D) After metamorphosis is complete
33. What happens to limbs during premetamorphosis?  $\Delta$   
 A) They degenerate B) They remain dormant  
 C) They use TR $\alpha$  to convert T4 to T3 and start growing D) They produce T4
34. Cancer stem cells (CSCs) are characterized by:  $\Delta$   
 A) Rapid differentiation into mature cancer cells B) High sensitivity to chemotherapy  
 C) Capabilities of self-renewal, differentiation, and tumorigenicity D) Inability to self-renew
35. Which of the following are cellular components of the CSC niche? ■  
 A) Red blood cells B) Only epithelial cells C) CAFs, TAMs, and MSCs D) Platelets only
36. Epithelial-mesenchymal transition (EMT) contributes to: ■  
 A) Cell death B) Immune system activation  
 C) Cancer cells' invasive capacities and metastasis initiation D) Complete cell differentiation
37. MSCs can enhance CSC characteristics through which signaling pathways? ■  
 A) Only glycolysis B) Wnt, Notch, and Hedgehog C) Photosynthesis pathway D) Fermentation pathway
38. MSCs contribute to therapeutic resistance in CSCs by: ●  
 A) Killing the CSCs B) Creating a protective microenvironment for CSCs  
 C) Preventing CSC formation D) Activating the immune system against CSCs
39. Which therapeutic approach targets CSCs by inhibiting key signaling pathways? ●  
 A) Antibodies like Vantictumab targeting Wnt signaling B) Complete removal of all cells  
 C) Only radiation therapy D) Vitamin supplements
40. A major challenge in targeting CSCs therapeutically is: ●  
 A) CSCs share characteristics with normal stem cells, leading to potential toxicity B) CSCs are easy to identify  
 C) All therapies work perfectly on CSCs D) CSCs do not exist in most cancers

**II- Answer the following with details only five out of the seven options provided.**  
(10 marks, two mark for each)

- 1- Explain the classification of stem cells based on their origin, and provide specific examples of each type with their characteristics. △
- 2- Explain the three major branches of modern embryology (Experimental, Comparative, and Molecular) and discuss how each contributes to our understanding of development. ■ \*
- 3- Compare and contrast benign and malignant tumors. Discuss their gross features, growth patterns, and clinical outcomes. △ ■
- 4- Explain the classification of natural parthenogenesis based on chromosome number. Describe haploid and diploid parthenogenesis. △ ■
- 5- Describe the concept of the cancer stem cell (CSC) niche and explain its importance in maintaining CSC properties. ● ● ■
- 6- Define parthenogenesis and explain the two main types based on mode of occurrence. ■
- 7- Discuss the importance of embryology in modern medicine and research. Provide specific examples of its applications. ○