



UNIVERSITY OF THE PUNJAB

Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Zoology
PAPER: I (Environmental Biology)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

1.	a- Describe in brief different PHYSICAL FACTORS affecting PRIMARY PRODUCTIVITY? b- Briefly discuss the EVOLUTION of ATMOSPHERE.	8 7
2.	a. Define and explain FOOD CHAIN and FOOD WEB, giving suitable example. b- Differentiate between AUTECOLOGY and SYNECOLOGY, giving suitable example.	7.5+7.5
3.	a- Define ACID RAIN? How does it affect human life? b- What is SMOG? How does it differ from FOG? Give in detail its causes and effects?	7 8
4.	a- Give a brief account of different ENVIRONMENTAL LAWS? b-What do you know about GLOBAL WARMING?	8 7
5.	Write short notes on: a- POPULATION SURVIVALSHIP PATTERNS b- DESALINATION c- ECOLOGICAL PYRAMIDS	5+5+5
6.	a- Define and explain SYMBIOSIS with respect of its role in an Ecosystem? b- Write an essay on the BIOLOGICAL WAREFARE.	8 7
7.	a- Briefly describe the mechanism of BIOLOGICAL SUCCESSION. b- Define and explain GREENHOUSE EFFECT?	8 7
8.	a. Write a detailed essay on CHEMICAL WARFARE. b. How can the WETLANDS be used for TREATMENT of SEWAGE water?	8 7
9.	a- Write a detailed note on Ecology of Rivers? b- Write a precise note on AGE DISTRIBBUTION?	8 7



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Subject: Zoology

TIME ALLOWED: 3 hrs.

PAPER: II (Evolution and Principles of Systematic Zoology)

MAX. MARKS: 75

NOTE: Attempt FIVE questions: THREE from Part A and TWO from Part B.

Serial No. of Question	Questions	No. of Marks
PART A		
Q1.	What is natural selection? Describe types of natural selection with examples.	15
Q2	Describe factors that cause microevolution.	15
Q3	Give detail account on the theories of sexual selection.	15
Q4	a Why population is not a unit of selection?	8
	b How Punctuated equilibrium theory differs from Phyletic Gradualism?	7
Q5.	Give detail account on the causes of imperfect adaptations	15
PART B		
Q6.	a Describe various methods of taxonomic collection.	8
	b Discuss difficulties of biological species concept.	7
Q7.	a Discuss the concept of polytypic species.	8
	b Describe the Types of Key in detail.	7
Q8.	Describe major types of Taxonomic characters.	15
Q9.	a Write notes on	8
	b Types of taxonomic publications First Reviser Principal	7



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TIME ALLOWED: 3 hrs.

PAPER: III (Zoogeography & Principles of Palaeontology)

MAX. MARKS: 75

**NOTE: Attempt any FIVE questions. Select at least TWO questions from each part.
All questions carry equal marks.**

Part- I (Paleontology)

Q 1: Write note on the following; (a) Plutonic rocks (b) Metamorphic rocks (c) *Homo-habilis*

(5+5+5) 15

Q 2: Write a comprehensive note on Cenozoic Life

15

Q 3: Write a detailed note of different types of Fossils

15

Q 4: Write note on the following; (a) Main concepts of Human evolution (b) Lithosphere (c)

Upper Siwaliks

(5+5+5) 15

Q 5: Discuss the evolutionary History of Camels

15

Part- II (Zoogeography)

Q 6: Write a descriptive note on (i) Continental Islands (ii) Means of Dispersal

(8+7) 15

Q 7: Discuss Zoogeographical Features, Climate and Fauna of Palearctic Region

15

Q 8: Discuss the following; (a) Plate Tectonic Theory (b) Oceanic Islands

(8+7) 15

Q 9: Write a detail note on the theories of Land Bridges

15

Q 10: Give the Zoogeographical Distribution of the following animals;

(i) Ostrich (ii) *Elephas* (iii) *Hippopotamus* (iv) *Struthio* (v) Kangaroo

(vi) Peacock (vii) *Bos* (viii) Tree Frog (ix) Opossum (x) *Protopterus*

(1.5 each) 15



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Subject: Zoology

PAPER: IV-6A (Fisheries 'A')

Principles of Fish Biology)

TIME ALLOWED: 3 hrs.

MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q. # 1: What is FISH? Where and how it lives? What is its IMPORTANCE as food for human?
- Q. # 2: Enlist the representative FAMILIES of major groups of fishes, especially inhabiting FRESHWATER OF PUNJAB along with examples.
- Q. # 3: Write a detailed note on KIDNEY in fish? Give the adaptations in kidney for osmoregulation in different aquatic habitats.
- Q. # 4: Compare DIGESTIVE SYSTEM in herbivore and carnivore fishes.
- Q. # 5: Describe the ZONATION IN OCEANS. Give the examples of fishes in various zones.
- Q. # 6: What do you know about NERVOUS SYSTEM and its components in fish? Discuss in detail.
- Q. # 7: Write a comparative note on HEART in different groups of fishes, draw the diagrams also.
- Q # 8: Discuss the SCALES on the BASIS OF STRUCTURE in fishes. Draw their labeled diagrams.
- Q. # 9: Write a note on the following:
a) Swim Bladder in Fish
b) Tilapia Culture



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Subject: Zoology

PAPER: IV-I-A (Entomology 'A')

Morphology, Physiology & Ecology

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

Q.1	Give a brief account of endocrine glands of insects.	15
Q.2	Write down excretory system of insects with reference to malpighian tubules.	15
Q.3	Explain the nervous system of an insect and its physiology.	15
Q.4	Explain the thorax of an insect and modification of legs	15
Q.5	Write short notes on a) Insect pheromone and their functions b) Diapause in insect population c) Metamorphosis in insects	15 (3x5)
Q.6	What do you mean by spiracle? Explain the structure of different types of spiracles.	15
Q.7	Describe in detail a. Methods of sound production in insects b. How sound is produced by cicada?	15 (7+8)
Q.8	Describe the digestive system in insects with labelled diagram.	15
Q.9	Describe in detail a. Modifications of wings in insects b. Wing coupling apparatus in insects	15 (7+8)



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Subject: Zoology

PAPER: IV-5A (Microbiology 'A'
General Microbiology)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q. 1 Describe the contribution of Antony van Leewenhoek, Louis Pasteur and Robert Koch to the development of the science of microbiology in details. 15
- Q. 2 a) Discuss major characteristics of microorganisms 8
b) Describe characteristics of algae in detail. 7
- Q. 3 a) Write a note on numerical taxonomy. 8
b) Discuss importance of Mycorrhizae. 7
- Q. 4 Describe the working principle and specific applications of electron microscopy. 15
- Q. 5 Discuss differences between Gram's negative and Gram's positive bacteria with the help of labelled diagrams. 15
- Q. 6 What is the importance of studying cultural characteristics of bacteria? Describe different cultural characteristics of bacteria. 15
- Q. 7 Write notes on the followings:
a- Acidophiles and Halophiles 05
b- Bacterial endospores 05
c- Synchronous growth 05
- Q. 8 What is meant by bacteriological medium? Explain different types of media. 15
- Q. 9 Give a comprehensive note on different nutritional requirements of microorganisms. 15



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Part-II A/2017
Examination:- M.A./M.Sc.

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Subject: Zoology

PAPER: IV-IB (Entomology 'B')

Classification of Insects and Pest Management)

TIME ALLOWED: 3 hrs.

MAX. MARKS: 75

NOTE: Attempt FIVE questions selecting THREE from section-I and TWO from Section-II

SECTION-I

- Q.1. a) What are the diagnostic features of Hemiptera? 3,12
b) Describe important features and economic importance of any three families of Hemiptera.
- Q.2. a) Differentiate between Insect and Pest. 3,12
b) Give diagnostic features and economic importance of the followings:
i) Trichogrammatidae ii) Xylocopidae iii) Siphonaptera
- Q.3. Describe details of the followings: 15
i) Odonata ii) Thysanoptera
- Q.4. Give an account of economically important insects that attack rice. 15
- Q.5. Write notes on the followings: 15
i) Collembola ii) Siphunculata

SECTION-II

- Q.6. Write notes on the followings. 15
a) Biological control
b) Economic injury level
c) Colonization
- Q.7. Give details of organochlorine insecticides. 15
- Q.8. Discuss chemical control of different insects and indicate their possible impacts on environment and other organisms. 15
- Q.9. What are the attributes of the beneficial organisms for an effective biological control programme? 15

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Part-II A/2017
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Subject: Zoology
PAPER: IV-3B (Physiology 'B')

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

1. Describe the structure of heart also explain the cardiac cycle and its regulation in detail.
2. What is osmolality? Describe the structural and functional role of nephron in controlling osmolality and body fluid volume.
3. Describe the structure and function of glomerulus and collecting ducts.
4. Explain the functional anatomy and regulation of duodenum; also explain its role in digestion and absorption.
5. What is thermoregulation, discuss temperature relations of animals and also explain special metabolic states of animals.
6. Describe the mechanism of ventilation and also explain the function of respiratory epithelium of lungs.
7. What are the hormone of GIT describe their function and regulation.
8. Explain osmoregulation and its control with special reference to aquatic and terrestrial life.
9. Write note on the following
 - a) Ischemic heart disease
 - b) Physiology of Salivary glands
 - c) Pulmonary and bronchial circulation



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Subject: Zoology

PAPER: IV-5B (Microbiology-B
Applied Microbiology)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

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|-------|--|----|
| Q. 1. | What is meant by hypersensitivity? Discuss its types with suitable sketches. | 15 |
| Q. 2. | Enlist the chemicals used to control microorganism. Discuss the recommended uses and limitations of different chemicals. | 15 |
| Q. 3. | a) Write a detail account on complement system | 10 |
| | b) Discuss the benefits of normal flora of human. | 5 |
| Q. 4. | Write the functional antibiotic classification scheme. How antibiotics inhibit cell wall synthesis. Discuss with suitable examples. | 15 |
| Q. 5 | a) What is meant by chemotherapy? Write a detailed note on characteristics of antibiotics qualifying them as chemotherapeutic agent. | 5 |
| | b) Write a note on water purification process. | 5 |
| | c) Describe in detail the method of pasteurization. | 5 |
| Q. 6. | a) Explain the role of microorganism in sulfur cycle | 8 |
| | b) Write a note on natural waters. | 7 |
| Q. 7. | a) What is fermentation? Discuss fermented dairy products. | 8 |
| | b) Give a comprehensive note on microorganism used as food. | 7 |
| Q. 8 | a) Describe the effect of holding temperature on raw milk. | 8 |
| | b) Write a detailed note on impact of biotechnology on human life? | 7 |
| Q. 9 | a) Differentiate between pathogenicity and virulence. Explain virulence factors of pathogenic bacteria. | 8 |
| | b) Explain mode of action of botulinum toxin | 7 |



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Subject: Zoology

PAPER: IV-6B (Fisheries 'B')

Fish Physiology and Breeding)

TIME ALLOWED: 3 hrs.

MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

Q.No.1. (a) Write a note on stomach and intestine of fishes. (7.8)

(b) Describe the various feed ingredients obtained from animal origin.

Q.No.2. Describe morphology and ratio of various blood cells in fishes. (15)

Q.No.3. (a) Write a detailed note on osmoregulation in teleost fishes. (6.9)

(b) Discuss the kidney structure of freshwater fishes.

Q.No.4. Describe the maturation process in fishes and factors affecting the fish maturation. (15)

Q.No.5. Explain endocrine hormones regulation in reproduction of fishes. (15)

Q.No.6. Describe hormonal induced breeding in major carps. (15)

Q.No.7. Write a detailed note on developmental stages in fish. (15)

Q.No.8. Write a detailed note on migration in fishes. (15)

Q.No.9. Write short note on the following (5.5.5)

- a) Homeostasis
- b) Fish lungs
- c) Gonads in fish



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✓ Subject: Zoology
PAPER: V-17 (Fish Disease & Health Management)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q.No.1 Write a detailed note on causes and effects of diseases in fishes. (7.5+7.5)
- Q.No.2 EUS is a disease prevalent in pond fed with river water. Describe this disease. (15)
- Q.No.3 Dactylogyrosis is a serious gill disease, explain it. (15)
- Q No.4 Describe different methods of treatment of fish. (15)
- Q.No.5 Describe three diseases of fish caused by nutritional deficiency. (5+5+5)
- Q.No.6 Explain Viral Hemorrhagic Septicemia in carps, its causative agent, symptoms and treatment. (15)
- Q No.7 Describe Argulosis in fish and its treatment. (15)
- Q No.8 Explain intensive, semi intensive and intensive fish culture. (15)
- Q.No.9 Write notes on following: (7.5+7.5)
- i) *Lernaea* sp.
 - ii) Anoxia



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Subject: Zoology

PAPER: V-7 (Molecular and Clinical Endocrinology)

TIME ALLOWED: 3 hrs.

MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks. Support your account with illustrations, where necessary.

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|-------|--|--------|
| Q. 1. | Give a detailed account of abnormalities of growth hormone secretion. | 15 |
| Q. 2. | Give a comprehensive account differentiating endemic from idiopathic nontoxic colloid goiter. | 15 |
| Q. 3. | Account, comprehensively, the lipid derived second messenger system. | 15 |
| Q. 4. | Give a detailed account of Cushing's syndrome. | 15 |
| Q. 5. | Describe the role of pineal gland in controlling seasonal fertility in some animals. | 15 |
| Q. 6. | Describe, in detail, the causes and consequences of rickets in children. | 15 |
| Q. 7. | Write notes on the following:
a) Natural and synthetic hormones used in treatments
b) Hormones involved in stress response | 8
7 |
| Q. 8. | Describe, in detail, the role of GTP binding proteins in cell signaling. | 15 |
| Q. 9. | Discuss, comprehensively, the structure and function of G Protein-Coupled receptors | 15 |



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Subject: Zoology
PAPER: V-39 (Apiculture)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any Five questions. All questions carry equal marks.

Q.1	a) Write down significance of Apiculture. b) Give brief account on types of honeybees and their distribution in Pakistan.	15 (7+8)
Q.2	Give brief account on basic beekeeping equipment.	15
Q.3	Explain colony life of honeybee organizational setup of a colony.	15
Q.4	Name main byproducts of apiculture and describe their uses.	15
Q.5	Give brief account on natural enemies of honeybees and mite diseases	15
Q.6	Write short notes on i. Laying workers ii. Honey dew honey iii. Honey bee pollination iv. Honey granulation v. Apitherapy	15 (5x3)
Q.7	Explain role of honeybees as pollinators in ecosystem.	15
Q.8	What are major nectar and pollen sources for honeybees in the country?	15
Q.9	Write notes on a. Swarming in honeybee colony b. Absconding in honey bee colony	15 (8+7)



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Subject: Zoology
PAPER: V-1 (Integrated Pest Management)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- | | |
|---|----|
| Q. 1. Discuss the role of CROP SPACING , TRAP CROP and CROP ROTATION in the control of Pests. | 15 |
| Q. 2. Give a detailed account on PYRETHEROIDS . | 15 |
| Q. 3. Write a concise essay on TRANSGENIC CROPS in Agriculture. | 15 |
| Q. 4. How can you divert the pest population away from the crop using TRAP CROP and INTERCROP methods? | 15 |
| Q. 5. Compare the BIOLOGICAL and CHEMICAL Insecticides. | 15 |
| Q. 6. Discuss AUGUMENTATION with reference to the natural enemy. | 15 |
| Q. 7. How would you apply Reduce-Number and Reduce-Crop-Susceptibility Strategies with respect to integrated pest management. | 15 |
| Q. 8. Describe Perennial and Severe Pests in detail. | 15 |
| Q. 9. Write SHORT NOTES on the following: | 15 |
| i) Insect Equivalent | |
| ii) Carrying Capacity | |
| iii) Synchronization | |



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Examination:- M.A./M.Sc.

Roll No.

Subject: Zoology
PAPER: V-20 (Mammalogy)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

Note:-Attempt any five questions. All questions carry equal marks. Elaborate your answers with labeled diagrams and flow charts.

Q:1	Write Orders and Distribution of the following mammals. i.Mongoose ii. Northern Palm Squirrel iii.Snow Leopard iv. Rhinoceros v.Porcupine vi.Flying Phlanger vii.African Elephant viii.Whale ix.Walrus x.Flying Fox	10x1.5 =15
Q:2	Give an account of the diagnostic features and affinities of Mammals.	15
Q:3	Classify Order Carnivora upto families with examples.	15
Q:4	Give the characteristics which separate the Marsupials from Monotremes.	15
Q:5	Differentiate between:- Cetacea and Sirenia Fossorial, Arboreal and gliding movement in Mammals	6+9=15
Q:6	Discuss the following: (a) Classify mammals according to their diet (b) Food and food storage in mammals (c) Movement s in mammals	3x5=15
Q:7	Write short notes on: (a)Hibernation (b)Aestivation (c) Migration	3x5=15
Q:8	Write a note on: (a)Echolocation in Bats (b)Horns and Antlers (c)Dentition in Mammals	3x5=15
Q:9	Write down different trends in mammalian evolution.	15



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Subject: Zoology

PAPER: V-18 (Fundamentals of Microbiology)

TIME ALLOWED: 3 hrs.

MAX. MARKS: 75

NOTE: Attempt any FIVE questions. All questions carry equal marks.

- Q. 1 Discuss in detail normal growth cycle of bacteria with emphasis on transitional phases. 15
- Q. 2 a) Give a detailed account of contributions of Louis Pasteur to the development of science of Microbiology. 10
- b) Write a note on cultivation of animal viruses 5
- Q. 3 a) Give a comprehensive note on phototrophs and chemotrophs. 8
- b) Write a note on synchronous growth of bacteria. 7
- Q. 4 Discuss some characteristics of major groups of microorganisms and their practical significance. 15
- Q. 5 Discuss nutritional requirements of bacteria in detail. 15
- Q. 6 a) Give grouping of bacteria with respect to their optimum gaseous requirements. 8
- b) Discuss different methods of laboratory selection of bacteria from natural samples. 7
- Q. 7 Make a comparison of cell walls of Gram positive bacteria with those of Gram negative bacteria. 15
- Q. 8 a) Discuss ecological and economic importance of algae. 8
- b) Write a note of Mycorrhizae in detail. 7
- Q. 9 Write notes on the followings.
- a- Importance of protozoa 05
- b- Thermopiles and Acidophiles 05
- c- Numerical Taxonomy 05

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Part-II A/2017
Examination:- M.A./M.Sc.

Roll No.

Subject: Zoology
PAPER: V-16 (Applied Fisheries)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 75

NOTE: Attempt any FOUR questions. All questions carry equal marks.

1. What is the difference between Semi intensive and Intensive fish culture. Which Culture system is sustainable and suits our local conditions. (15, 4)
2. How you would design a Cyprinid hatchery, how it would differ from a Catfish hatcher. What types of ponds would be needed in a Cyprinid hatchery. (15, 4)
3. Describe the Natural Food and Artificial food in fishes. How the natural food is produced in fish ponds. (12, 7)
4. What are the common diseases of Carp fishes, also describe their control and treatment. (18)
5. What is the role of organic and inorganic fertilizers in fish ponds? Describe the doses and methods of use of these fertilizers. (10, 9)
6. What is the role of Aquatic weeds in fish ponds. Describe the various methods of their control. (9, 10)
7. Describe the methods of harvesting and transport of fish in Pakistan. How we can improve them to ensure better flesh quality of fish. (12, 7)