

ASSOCIATE DEGREE IN SCIENCE

Zoology-II

Total Mark: 100

Appendix 'A'

(Outlines of Tests)

Paper-A:	Chordates Diversity (Classification, Phylogeny and Organization) (Written)	:	35 Marks
Paper-B:	Animal form and function (A comparative Perspective) (Written)	:	35 Marks
Paper-C:	Practical-I	:	15 Marks
Paper-D:	Practical-II	:	15 Marks

Appendix 'B'

(Syllabi and Courses of Reading)

Paper-A: Chordates Diversity (Classification, Phylogeny and Organization) 35 Marks

1. Hemichordata and Invertebrate Chordates

Evolutionary Perspective: Phylogenetic Relationships; Classification up to subphylum or class where applicable; Further Phylogenetic Considerations.

2. The Fishes: Vertebrate Success in Water

Evolutionary Perspective: Phylogenetic Relationships; Survey of Superclass Agnatha and Gnathostomata; Evolutionary Pressures: Adaptations in Locomotion, Nutrition and the Digestive System, Circulation, Gas Exchange, Nervous and Sensory Functions, Excretion and Osmoregulation, Reproduction and Development; Further Phylogenetic Considerations.

3. Amphibians: The First Terrestrial Vertebrates

Evolutionary Perspective: Phylogenetic Relationships; Survey of Order Caudata, Gymnophiona, and Anura. Evolutionary Pressures: Adaptations in External Structure and Locomotion, Nutrition and the Digestive System, Circulation, Gas Exchange, Temperature Regulation, Nervous and Sensory Functions, Excretion and Osmoregulation, Reproduction, Development, and Metamorphosis; Further Phylogenetic Considerations.

4. Reptiles: The First Amniotes

Evolutionary Perspective: Cladistic Interpretation of the Amniotic Lineage; Survey of Order Testudines or Chelonia, Rhynchocephalia, Squamata, and Crocodilia; Evolutionary Pressures: Adaptations in External Structure and Locomotion, Nutrition and the Digestive System, Circulation, Gas Exchange, and Temperature Regulation, Nervous and Sensory Functions, Excretion and Osmoregulation, Reproduction and Development; Further Phylogenetic Considerations.

5. Birds: Feathers, Flight, and Endothermy

Evolutionary Perspective: Phylogenetic Relationships; Ancient Birds and the Evolution of Flight; Diversity of Modern Birds; Evolutionary Pressures: Adaptation in External Structure and Locomotion, Nutrition and the Digestive System, Circulation, Gas Exchange, and Temperature Regulation, Nervous and Sensory Systems, Excretion and Osmoregulation, Reproduction and Development; Migration and Navigation.

6. Mammals: Specialized Teeth, Endothermy, Hair, and Viviparity

Evolutionary Perspective: Diversity of Mammals; Evolutionary Pressures: Adaptations in External Structure and Locomotion, Nutrition and the Digestive System, Circulation, Gas Exchange, and Temperature Regulation, Nervous and Sensory Functions, Excretion and Osmoregulation, Behavior, Reproduction and Development.

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Paper-B: Animal form and function (A comparative Perspective)

35 Marks

1. Protection, Support, and Movement

Protection: The Integumentary System of Invertebrates and Vertebrates; Movement and Support: The Skeletal System of Invertebrates and Vertebrates; Movement: Non-muscular Movement; An Introduction to Animal Muscles; The Muscular System of Invertebrates and Vertebrates.

2. Communication I: Nerves

Neurons: Structure and Function; Neuron Communication: Introductory accounts of Resting Membrane Potential, Action Potential (Nerve Impulse) and Transmission of the Action Potential between Cells; Invertebrate and Vertebrate Nervous Systems: The Spinal Cord, Spinal Nerves, The Brain, Cranial Nerves and The Autonomic Nervous System.

3. **Communication II: Senses**

Sensory Reception: Baroreceptors, Chemoreceptors, Georeceptors, Hygroreceptors, Phonoreceptors, Photoreceptors, Proprioceptors, Tactile Receptors, and Thermoreceptors of invertebrates; Lateral-Line System and Electrical Sensing, Lateral-Line System and Mechanoreception, Hearing and Equilibrium in Air, Hearing and Equilibrium in Water, Skin Sensors of Damaging Stimuli, Skin Sensors of Heat and Cold, Skin Sensors of Mechanical Stimuli, Sonar, Smell, Taste and Vision in Vertebrates.

4. **Communication III: The Endocrine System and Chemical Messengers**

Chemical Messengers: Hormones Chemistry; and Their Feedback Systems; Mechanisms of Hormone Action; Some Hormones of Porifera, Cnidarians, Platyhelminths, Nemertean, Nematodes, Molluscs, Annelids, Arthropods, and Echinoderms Invertebrates; An Overview of the Vertebrate Endocrine System; Endocrine Systems of Vertebrates other Than Birds or Mammals; Endocrine Systems of Birds and Mammals.

5. **Circulation, Immunity, and Gas Exchange**

Internal Transport and Circulatory Systems in Invertebrates: Characteristics of Invertebrate Coelomic Fluid, Hemolymph, and Blood Cells; Transport Systems in Vertebrates; Characteristics of Vertebrate Blood, Blood Cells and Vessels; The Hearts and Circulatory Systems of Bony Fishes, Amphibians, and Reptiles, Birds and Mammals; The Human Heart: Blood Pressure and the Lymphatic System; Immunity: Nonspecific Defenses, The Immune Response; Gas Exchange: Respiratory Surfaces; Invertebrate and Vertebrate Respiratory Systems: Cutaneous Exchange, Gills, Lungs, and Lung Ventilation; Human Respiratory System: Gas Transport.

6. **Nutrition and Digestion**

Evolution of Nutrition; The Metabolic Fates of Nutrients in Heterotrophs; Digestion; Animal Strategies for Getting and Using Food Diversity in Digestive Structures of Invertebrates and Vertebrates; The Mammalian Digestive System: Gastrointestinal Motility and its Control, Oral Cavity, Pharynx and Esophagus, Stomach, Small Intestine: Main Site of Digestion; Large Intestine; Role of the Pancreas in Digestion; and Role of the Liver and Gallbladder in Digestion.

7. **Temperature and Body Fluid Regulation**

Homeostasis and Temperature Regulation; The Impact of Temperature on Animal Life; Heat Gains and Losses; Some Solutions to Temperature Fluctuations; Temperature Regulation in

Invertebrates, Fishes, Amphibians, Reptiles, Birds and Mammals; Heat Production in Birds and Mammals; Control of Water and Solutes (Osmoregulation and Excretion); Invertebrate and Vertebrate Excretory Systems; How Vertebrates Achieve Osmoregulation; Vertebrate Kidney Variations; Mechanism in Metanephric Kidney Functions.

8. Reproduction and Development

A sexual Reproduction in Invertebrates; Advantages and Disadvantages of Asexual Reproduction; Sexual Reproduction in Invertebrates; Advantages and Disadvantages of Sexual Reproduction; Sexual Reproduction in Vertebrates; Reproductive Strategies; Examples of Reproduction among Various Vertebrate Classes; The Human Male Reproductive System: Spermatogenesis, transport and Hormonal Control, Reproductive Function; The Human Female Reproductive System: Folliculogenesis, transport and Hormonal Control, Reproductive Function; Hormonal Regulation in gestation; Prenatal Development and Birth Events of Prenatal Development: The Placenta; Birth; Milk Production and Lactation.

9. Descriptive Embryology

Fertilization; Embryonic Development: Cleavage, and Egg Types; The Primary Germ Layers and their Derivatives; Echinoderm Embryology; Vertebrate Embryology: The Chordate Body Plan, Amphibian Embryology, Development in Terrestrial Environments, Avian Embryology, The Fate of Mesoderm.

Paper-C: Practical-I

15 Marks

1. Study of a representative of hemichordate and invertebrate chordate.
2. Study of representative groups of class fishes.
3. Study of representative groups of class Amphibia.
4. Study of representative groups of class Reptelia.
5. Study of representative groups of class Aves.
6. Study of representative groups of class Mammalia.
7. Field trips to study animal diversity in an ecosysem.

Note : Preserved specimen and or colored projection slide and or CD ROM projection of computer must be used.

Paper-D: Practical-II

15 Marks

1. Study and notes on skeleton of *Labeo*, *Rana tigrina*, *Varanus*, fowl and Rabbit,
Note for 1: Exercises of notes on the adaptations of skeletons to their function must be done.
2. Earthworm or leech; cockroach, freshwater mussel, *Channa* or *Catla catla* or *Labeo* or any other local fish, frog, pigeon and rat or mouse or rabbits are representative animals for study in dissections.
3. Study of models or preserved brains of representative animals and notes on adaptations.
4. Study of nervous system of earthworm and a fish.
5. Study of endocrine system in an insect and a mammal.
6. Study of different types of blood cells in blood smear.
7. Study of heart, principal arteries and principle veins in a representative vertebrate.
8. Study of respirator system in cockroach or locust and a vertebrate representative
9. Study of excretory system in an invertebrate and a vertebrate representative
10. Study of nutritive canal in an invertebrate and a vertebrate representative
11. Study of male reproductive system in an invertebrate and a vertebrate representative
12. Study of female reproductive system in an invertebrate and a vertebrate representative.
13. Study of hormonal influence of a reproductive function
14. Study of preserved advanced stages of avian and mammalian development for amniotic membranes and placenta

Recommended Books:

1. Miller, A.S. and Harley, J.B., 1999 & 2002. ZOOLOGY, 4th & 5th Edition (International). Singapore: McGraw Hill.
2. Hickman, C.P., Roberts, L.S. and Larson, A., 2001. INTEGRATED PRINCIPLES OF ZOOLOGY, 11th Edition (International). Singapore: McGraw Hill.
3. Pechenik, J.A., 2000. BIOLOGY OF INTERVEBRATES, 4th Edition (International). Singapore: McGraw Hill.

4. Kent, G.C. and Miller, S., 2001. COMPARATIVE ANATOMY OF VERTEBRATES. New York: McGraw Hill.
5. Campbell, N.A., 2002. BIOLOGY, 6th Edition. Menlo Park, California: The Benjamin/Cummings Publishing Company, Inc.

Recommended Books for Practical:

1. Miller, S.A., 2002. GENERAL ZOOLOGY LABORATORY MANUAL. 5th Edition (International) Singapore: McGraw Hill;
2. Hickman, C.P. and Kats, H.L., 2000. LABORATORY STUDIES IN INTEGRATED PRINCIPLES OF ZOOLOGY. Singapore: McGraw Hill.