



NARAJOLE RAJ COLLEGE

(NAAC Accredited 'B' Grade Govt. Aided College)
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Zoology (Hons.) NEP

Course Outcome

Semester	I
Title of Course	Systematics and Diversity of Life- Protists to Chordates (MJ-1)
Paper Code	MJ-1T (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Honours & Major) of Semester-I will acquire an in-depth knowledge on the taxonomic position of Chordate diploblastic acoelomate animals and Chordate animals on the environment and on the Animal Diversity of Non-Chordate as well as Chordate phyla, their biology and role in the environment by studying this

The theory paper (MJ-1T) of this course (MJ-1) provides the students with-

CO1: To understand the details of products of evolutionary process and origin of life on Earth from primordial chemicals.

CO2: To understand the details of origin of metazoans and its body symmetry.

CO3: To understand the concept of mesozoa, parazoa & eumetazoa, evolution of germinal layer, body cavity and types of coelom.

CO4: To understand the details of classification of life cycles of animal kingdom, the adaptations & relationship between ontogeny & phylogeny.

CO5: To understand the basics of animal classification.

CO6: To understand the definitions relationship & utility of systematics, taxonomy, evolution, classification & nomenclature.

CO7: To understand the different phyletic lineages, the kinds & components of classification and Linnaean hierarchy.

CO8: To understand the concept of species & clade, the codes of zoological nomenclature, principle of priority, synonymy and homonymy, the six-kingdom concept of classification by Carl Woese and concept of major & minor phyla.

CO9: To understand the taxonomic position of Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO10: To understand the general and identifying characteristics of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO11: To understand the body organization of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO12: To understand the life cycle, pathogenicity and control measures of certain important animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO13: To understand the physiological mechanisms of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO14: To describe understand the taxonomic position and unique characters animals belonging to Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO15: To understand the evolution of coelom and metamerism.

CO16: To recognize the general and identifying characteristic features of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO17: To understand the classification of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO18: To recognize life functions body organization of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO19: To study the ecological role of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO20: To recognize the diversity of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO21: To understand the physiological mechanisms of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO22: To understand the evolutionary significance of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO23: To understand the relationships between Chordates and Non-Chordates.

CO24: To recognize the affinities of Non-Chordates with Chordates.

CO25: To understand the different categories of vertebrates and the general characters of vertebrates.

CO26: To study the outline classification of vertebrates.

CO27: To understand the ecological role of different groups of vertebrates.

CO28: To understand the diversity and the level of organization of vertebrates.

CO29: To understand the origin and evolutionary relationship in different subphylum of chordates.

CO30: To understand the different physiological mechanisms of different groups of vertebrates.

CO31: To study the advanced features of vertebrates over Protochordata.

CO32: To study the identifying characters of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO33: To study the classification of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO34: To study the basic organization and diversity of fishes with reference to aquatic adaptation & evolutionary transitions in fishes.

CO35: To understand the concept of Amphibian diversity and adaptability to dual mode of life in Amphibia.

CO36: To recognise the adaptive radiations in Reptilia, Aves and Mammals.

CO37: To understand the concept of volant, arboreal, cursorial, fossorial & secondary aquatic adaptations.

CO38: To understand the origin of Aves and Mammals.

CO39: To understand the features of venomous & non venomous snake, distribution & type of snake venom with antidote in India.

CO40: To understand the features of flying birds & running birds.

CO41: To understand the special features of Monotremes & Marsupials with evolutionary significance.

CO42: To understand the features of Features of living primates - Prosimi & Anthropeida.

Semester	I
Title of Course	Systematics and Diversity of Life- Protists to Chordates (MJ-1)
Paper Code	MJ-1P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Honours & Major) of Semester-I will acquire an in-depth concept on the parts of microscope, basic idea of fixatives, preservatives & stains and identification & ecological importance of Non-Chordate and Chordate animals by

The practical paper (MJ-1P) of this course (MJ-1) provides the students with-

CO1: To gain knowledge about the parts of microscope with their function & setting of microscopes, its calibration, magnification & drawing with the help of camera lucida.

CO2: To understand the basic idea of fixatives, preservatives & stains with preparation method and significance for study of museum specimen.

CO3: To study the different Non-Chordate and Chordate animals through identification of models, photographs, slides and museum specimens in the laboratory with details on their classification along with biogeography, adaptive features, ecological importance and diagnostic features.

CO4: To understand the study of animals in nature by the use of photographic device, sound recorder, GPS & binocular through demonstration or handling.

CO5: To observe & record different animals from college campus and nearby any terrestrial field (forest, grassland, hill or mountain area etc.) or water body (pond, river, lake, sea etc.) or zoological park or museum.

CO6: To study the comparison & weighting of characters of any two species of animal belonging to same genera or different genera but same family.

CO7: To understand the method of collection of species from arthropoda, mollusca, fish, reptile, bird and mammals.

CO8: To understand the assessment of relationship by constructing a cladogram using any five animals belonging to a clade.

CO9: To understand the preparation of key for identification of venomous and non-venomous snakes, insects, fishes & birds of different feeding habit (planktonivorous, detritivorous, frugivorous, carnivorous, omnivorous, insectivorous, piscivorous, graminivorous etc.).

CO10: To prepare a project work and seminar on any topic of practical courses.

Semester	I
Title of Course	Diversity of Life-Protists to Chordates (MI-1)
Paper Code	MI-1T (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Minor) of Semester-I will acquire an in-depth knowledge on the taxonomic position of Chordate diploblastic acoelomate animals and Chordate animals on the environment and on the Animal Diversity of Non-Chordate as well as Chordate phyla, their biology and role in the environment by studying this course.

The theory paper (MI-1T) of this course (MI-1) provides the students with-

CO1: To understand the products of evolutionary process and origin of life on Earth.

CO2: To understand the details of symmetry and cellularity.

CO3: To understand the concept of types & evolution of germinal layer, body cavity and types of coelom.

CO4: To understand the details of classification of life cycles of animal kingdom, the adaptations & relationship between ontogeny & phylogeny.

CO5: To understand the basics of animal classification.

CO6: To understand the definitions relationship & utility of systematics, taxonomy, evolution, classification & nomenclature.

CO7: To understand the different phyletic lineages, the kinds & components of classification and Linnaean hierarchy.

CO8: To understand the concept of species & clade, the codes of zoological nomenclature, principle of priority, synonymy and homonymy, the six-kingdom concept of classification by Carl Woese and concept of major & minor phyla.

CO9: To understand the taxonomic position of Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO10: To understand the general and identifying characteristics of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO11: To understand the body organization of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO12: To understand the life cycle, pathogenicity and control measures of certain important animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO13: To understand the physiological mechanisms of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO14: To describe understand the taxonomic position and unique characters animals belonging to Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO15: To understand the evolution of coelom and metamerism.

CO16: To recognize the general and identifying characteristic features of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO17: To understand the classification of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO18: To recognize life functions body organization of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO19: To study the ecological role of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO20: To recognize the diversity of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO21: To understand the physiological mechanisms of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO22: To understand the evolutionary significance of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO23: To understand the relationships between Chordates and Non-Chordates.

CO24: To recognize the affinities of Non-Chordates with Chordates.

CO25: To understand the different categories of vertebrates and the general characters of vertebrates.

CO26: To study the outline classification of vertebrates.

CO27: To understand the ecological role of different groups of vertebrates.

CO28: To understand the diversity and the level of organization of vertebrates.

CO29: To understand the origin and evolutionary relationship in different subphylum of chordates.

CO30: To understand the different physiological mechanisms of different groups of vertebrates.

CO31: To study the advanced features of vertebrates over Protochordata.

CO32: To study the identifying characters of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO33: To study the classification of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO34: To study the basic organization and diversity of fishes with reference to aquatic adaptation in fishes.

CO35: To understand the concept of emergence of land vertebrates in Amphibia.

CO36: To understand the concept of volant, arboreal, cursorial, fossorial & secondary aquatic adaptations.

CO37: To understand the features of venomous & non venomous snake, distribution & type of snake venom with antidote in India.

CO38: To understand the features of flying birds & running birds.

Semester	I
Title of Course	Diversity of Life-Protists to Chordates (MI-1)
Paper Code	MI-1P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Minor) of Semester-I will acquire an in-depth concept on the parts of microscope and identification & ecological importance of Non-Chordate and Chordate animals by studying this course.

The practical paper (MI-1P) of this course (MI-1) provides the students with-

CO1: To gain knowledge about the parts of microscope with their function & setting of microscopes, its calibration, magnification & drawing with the help of camera lucida.

CO2: To study the different Non-Chordate and Chordate animals through identification of models, photographs, slides and museum specimens in the laboratory with details on their classification along with biogeography, adaptive features, ecological importance and diagnostic features.

CO3: To observe & record different animals from college campus and nearby any terrestrial field (forest, grassland, hill or mountain area etc.) or water body (pond, river, lake, sea etc.) or zoological park or museum.

CO4: To study the comparison & weighting of characters of any two species of animal belonging to same genera or different genera but same family.

CO5: To understand the preparation of key for identification of venomous and non-venomous snakes.

Semester	I
Title of Course	Apiculture SKILL ENHANCEMENT COURSES (SEC 1)
Paper Code	SEC1
Credits	04
Hours	04 hours/week

The students of Zoology (Honours & Major) of Semester-I will acquire an enhanced knowledge on the biology and rearing of honeybees to establish a sustainable beekeeping cottage industry and development of entrepreneurship in this sector and also to make them understand about the prospects and entrepreneurship in Apiculture by studying this course.

The practical paper (SEC1) of this course (SEC-1) provides the students with-

CO1: To study the identification of different species of honeybees and different working groups of honey bees.

CO2: To study the morphology and sexual dimorphism of honey bees.

CO3: To study the pollen basket, mouth parts, sting apparatus, wax gland of worker honey bees.

CO4: To understand the different bee keeping methods and equipment for the extraction of honey.

CO5: To understand the basic concept regarding artificial bee rearing and construction of beehives – Newton and Langstroth.

CO6: To study the bee diseases and enemies, their control and preventive measures.

CO7: To gain knowledge on the products of Apiculture Industry and its uses.

CO8: To study the physical and chemical nature of honey.

CO9: To gain knowledge on the preparation of honey based products.

CO10: To understand the Bee Keeping Industry and the recent modern methods in employing artificial beehives for cross pollination in horticultural gardens.

CO11: To visit an apiculture farm and preparation a project report on apiculture to understand and gain knowledge regarding perquisite of beekeeping industry.

Semester	I
Title of Course	Diversity of Living World (MI-A1)
Paper Code	MJ-A1T (Theory)
Credits	02
Hours	04 hours/week

The students of Zoology (Pass) of Semester-I will acquire an in-depth knowledge on the taxonomic position of Chordate diploblastic acoelomate animals and Chordate animals on the environment and on the Animal Diversity of Non-Chordate as well as Chordate phyla, their biology and role in the environment by studying this course.

The theory paper (MJ-A1T) of this course (MJ-A1) provides the students with-

CO1: To understand the products of evolutionary process and origin of life on Earth.

CO2: To understand the details of symmetry and cellularity.

CO3: To understand the concept of Types & evolution of Germinal layer, body cavity and types of coelom.

CO4: To understand the details of classification of life cycles of animal kingdom, the adaptations & relationship between ontogeny & phylogeny.

CO5: To understand the basics of animal classification.

CO6: To understand the definitions relationship & utility of systematics, taxonomy, evolution, classification & nomenclature.

CO7: To understand the different phyletic lineages, the kinds & components of classification and hierarchical categories recognized by ICZN.

CO8: To understand the concept of species & clade, the codes of zoological nomenclature and the six-kingdom concept of classification by Carl Woese.

CO9: To understand the taxonomic position of Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO10: To understand the general and identifying characteristics of animals belonging to Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO11: To understand the body organization of animals belonging to Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO12: To understand the life cycle, pathogenicity and control measures of certain important animals belonging to Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO13: To understand the physiological mechanisms of animals belonging to Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO14: To describe understand the taxonomic position and unique characters animals belonging to Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO15: To understand the evolution of coelom and metamerism.

CO16: To recognize the general and identifying characteristic features of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO17: To understand the classification of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO18: To recognize life functions body organization of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO19: To study the ecological role of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO20: To recognize the diversity of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO21: To understand the physiological mechanisms of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO22: To understand the evolutionary significance of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO23: To understand the relationships between Chordates and Non-Chordates.

CO24: To recognize the affinities of Non-Chordates with Chordates.

CO25: To understand the different categories of vertebrates and the general characters of vertebrates.

CO26: To study the outline classification of vertebrates.

CO27: To understand the ecological role of different groups of vertebrates.

CO28: To understand the diversity and the level of organization of vertebrates.

CO29: To understand the origin and evolutionary relationship in different subphylum of chordates.

CO30: To understand the different physiological mechanisms of different groups of vertebrates.

CO31: To study the advanced features of vertebrates over Protochordata.

CO32: To study the identifying characters of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO33: To study the classification of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO34: To study the basic organization and diversity of fishes with reference to aquatic adaptation in fishes.

CO35: To understand the concept of emergence of land vertebrates in Amphibia.

CO36: To understand the features of venomous & non venomous snake, distribution & type of snake venom with antidote in India.

CO37: To understand the features of flying birds & running birds.

CO38: To understand the special features of Monotremes & Marsupials with evolutionary significance.

CO39: To understand the concept of volant, arboreal, cursorial, fossorial & secondary aquatic adaptations.

Semester	I
Title of Course	Diversity of Living World (MJ-A1)
Paper Code	MJ-A1P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Pass) of Semester-I will acquire an in-depth concept on the parts of microscope and identification & ecological importance of Non-Chordate and Chordate animals by studying this course.

The practical paper (MJ-A1P) of this course (MJ-A1) provides the students with-

CO1: To gain knowledge about the parts of microscope with their function & setting of microscopes, its calibration, magnification & drawing with the help of camera lucida.

CO2: To study the different Non-Chordate and Chordate animals through identification of models, photographs, slides and museum specimens in the laboratory with details on their classification along with biogeography, adaptive features, ecological importance and diagnostic features.

CO3: To understand the study of animals in nature by the use of photographic device, sound recorder, GPS & binocular through demonstration or handling and

observe & record different animals from college campus and nearby any terrestrial field (forest, grassland, hill or mountain area etc.) or water body (pond, river, lake, sea etc.) or zoological park or museum.

CO4: To understand the preparation of key for identification of venomous and non-venomous snakes, insects, fishes & birds of different feeding habit.

CO5: To study the comparison & weighting of characters of any two species of animal belonging to same genera or different genera but same family.

Semester	I
Title of Course	Animal Diversity (MI-01/C1-01)
Paper Code	MI-01T/C1-01 (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Pass) of Semester-I will acquire an in-depth knowledge on the taxonomic position of Chordate diploblastic acoelomate animals and Chordate animals on the environment and on the Animal Diversity of Non-Chordate as well as Chordate phyla, their biology and role in the environment by studying this course.

The theory paper (MI-01T) of this course (MI-01) provides the students with-

CO1: To understand the products of evolutionary process and origin of life on Earth.

CO2: To understand the details of symmetry and cellularity.

CO3: To understand the concept of Types & evolution of Germinal layer, body cavity and types of coelom.

CO4: To understand the details of classification of life cycles of animal kingdom, the adaptations & relationship between ontogeny & phylogeny.

CO5: To understand the basics of animal classification.

CO6: To understand the definitions relationship & utility of systematics, taxonomy, evolution, classification & nomenclature.

CO7: To understand the different phyletic lineages, the kinds & components of classification and Linnaean hierarchy.

CO8: To understand the concept of species & clade, the codes of zoological nomenclature, principle of priority, synonymy and homonymy, the six-kingdom concept of classification by Carl Woese and concept of major & minor phyla.

CO9: To understand the taxonomic position of Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO10: To understand the general and identifying characteristics of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO11: To understand the body organization of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO12: To understand the life cycle, pathogenicity and control measures of certain important animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO13: To understand the physiological mechanisms of animals belonging to Protozoa, Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematoda.

CO14: To describe understand the taxonomic position and unique characters animals belonging to Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO15: To understand the evolution of coelom and metamerism.

CO16: To recognize the general and identifying characteristic features of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO17: To understand the classification of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO18: To recognize life functions body organization of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO19: To study the ecological role of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO20: To recognize the diversity of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO21: To understand the physiological mechanisms of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO22: To understand the evolutionary significance of animals belonging to Phylum Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata and Hemichordata.

CO23: To understand the relationships between Chordates and Non-Chordates.

CO24: To recognize the affinities of Non-Chordates with Chordates.

CO25: To understand the different categories of vertebrates and the general characters of vertebrates.

CO26: To study the outline classification of vertebrates.

CO27: To understand the ecological role of different groups of vertebrates.

CO28: To understand the diversity and the level of organization of vertebrates.

CO29: To understand the origin and evolutionary relationship in different subphylum of chordates.

CO30: To understand the different physiological mechanisms of different groups of vertebrates.

CO31: To study the advanced features of vertebrates over Protochordata.

CO32: To study the identifying characters of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO33: To study the classification of animals belonging to Pisces, Amphibia, Reptilia, Aves and Mammals.

CO34: To study the basic organization and diversity of fishes with reference to aquatic adaptation in fishes.

CO35: To understand the concept of emergence of land vertebrates in Amphibia.

CO36: To understand the concept of volant, arboreal, cursorial, fossorial & secondary aquatic adaptations.

CO37: To understand the features of venomous & non venomous snake, distribution & type of snake venom with antidote in India.

CO38: To understand the features of flying birds & running birds.

Semester	I
Title of Course	Animal Diversity (MI-01/C1-01)
Paper Code	MI-01P/C1-01P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Pass) of Semester-I will acquire an in-depth concept on the parts of microscope and identification & ecological importance of Non-Chordate and Chordate animals by studying this course.

The practical paper (MI-01P) of this course (MI-01) provides the students with-

CO1: To gain knowledge about the parts of microscope with their function & setting of microscopes, its calibration, magnification & drawing with the help of camera lucida.

CO2: To study the different Non-Chordate and Chordate animals through identification of models, photographs, slides and museum specimens in the laboratory with details on their classification along with biogeography, adaptive features, ecological importance and diagnostic features.

CO3: To observe & record different animals from college campus and nearby any terrestrial field (forest, grassland, hill or mountain area etc.) or water body (pond, river, lake, sea etc.) or zoological park or museum.

CO4: To study the comparison & weighting of characters of any two species of animal belonging to same genera or different genera but same family.

CO5: To understand the preparation of key for identification of venomous and non-venomous snakes.

Semester	II
Title of Course	Cell Biology (MJ-2)
Paper Code	MJ-2T (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Honours & Major) of Semester-II will develop students' knowledge on the basic concepts of cellular structure and function of prokaryotic and eukaryotic cell organelles, the complex regulatory mechanisms that control cell function and also acquire an in-depth concept on the membrane macromolecules and cell organelles and principles of the cell theory by studying this course.

The theory paper (MJ-2T) of this course (MJ-2) provides the students with-

CO1: To understand the details of cell theory and its modern version and interpretation.

CO2: To study the basic general structure of prokaryotes, bacteria, archaea and eukaryotes.

CO3: To understand responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

CO4: To study the ultra structure and composition of Plasma membrane, Lipid Bilayer Fluid mosaic model, Peripheral and Integral Membrane proteins, Glycolipids and Glycoproteins; Membrane receptor modifications: microvilli, desmosomes and plasmodesmata; Mobility of membrane lipids and membrane proteins, Lipid rafts; Cell-cell junctions.

CO5: To study the active and passive transport across membrane, endocytosis and exocytosis.

CO6: To understand the structure and functions of Endoplasmic Reticulum, overview of protein sorting, protein folding and processing in ER, export of proteins and lipids from ER.

CO7: To understand the structure, morphology and functions of Golgi apparatus, protein glycosylation within Golgi, protein sorting and export from Golgi apparatus.

CO8: To understand the structure and functions of Lysosomes, polymorphism and lysosome formation.

CO9: To study the structure of mitochondria, its semi-autonomous nature, the endosymbiotic hypothesis of Mitochondrial Respiratory Chain and mitochondrial DNA.

CO10: To understand the structure and functions of peroxisomes and centrosome.

CO11: To study the type, structure and functions of cytoskeleton, microtubules, actin filaments, and intermediate filaments, basic composition and function of ECM and have a brief idea about cell-matrix interactions molecular motors.

CO12: To understand the structure and functions of interphase nucleus, ultra structure of nuclear membrane and basic concept of pore complex, nuclear envelope, nuclear pore complex, general organization, chemical composition and functions of nucleolus, nuclear matrix, chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome) and nucleo-cytoplasmic interactions.

CO13: To understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved.

CO14: To understand the cellular components underlying mitotic and meiotic cell division.

CO15: To develop a clear concept on cell cycle, cell division check points and their regulations.

CO16: To understand the role of growth factors, mutations in the genes that regulate cell cycle and division and their role in causing cancer and the concept of Programmed cell death (Apoptosis).

CO17: To develop a clear concept on cancer, protooncogene & tumor suppressor genes with special reference to p53 and activation of a protooncogene to oncogene.

CO18: To understand the detailed knowledge of different pathways related to cell signalling and apoptosis thus enabling them to understand the anomalies in cancer.

CO19: To study the different cell signalling transduction pathways, modes of cell-cell communication, and types of signalling molecules and receptors GPCR and G-protein mediated signalling (Adenyl cyclase-cAMP), Enzyme linked Receptors: RTK (ras-raf).

CO20: To develop an understanding how cells work in healthy and diseased states and to give a 'health forecast' by analyzing the genetic database and cell information.

CO21: To get new avenues of joining research in areas such as genetic engineering of cells, cloning, vaccines development, human fertility programme, organ transplant, etc.

CO22: To study the tools and techniques used to study cell, the principle of Light Microscope, Phase contrast microscope, Fluorescence Microscope and Principle of SEM & TEM.

CO23: To study the animal cell culture and different types of cell culture- monolayer and suspension culture.

CO24: To study the types of culture media, the sterilization methods for culture wares and culture media and maintenance of a cell line and storage of cells, the basic concept of subcellular fractionation and ultracentrifugation.

Title of Course	Cell Biology (MJ-2)
Paper Code	MJ-2P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Honours & Major) of Semester-II will acquire the practical knowledge on how to study the various stages of mitosis and meiosis, methods of cell viability study and learn to prepare temporary and permanent stained slides of human cells by studying this course.

The practical paper (MJ-2P) of this course (MJ-2) provides the students with-

CO1: To study the cell viability by Trypan Blue Exclusion method.

CO2: To study the preparation of chromosome squashes from grasshopper testes for the observation of stages of meiosis.

CO3: To study the preparation of temporary stained squash of onion root tip to study various stages of mitosis.

CO4: To study the preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.

Semester	II
Title of Course	Insect vector & disease (MI-2)
Paper Code	MI-2T (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Minor) of Semester-II will acquire knowledge about an insight into the common vector-borne diseases, their etiology and develop an awareness about the causative agents and control measures of many commonly occurring diseases, role of vectors in their spread, host- parasite relationship and finally the strategies to manage these vectors by studying this course.

The theory paper (MI-2T) of this course (MI-2) provides the students with-

CO1: To study the general and morphological features from head to eyes, types of antennae, mouth parts of insects.

CO2: To study the types of vectors, vector bionomics and morphological peculiarities of different vectors.

CO3: To understand the host-vector relationship, their adaptations as vectors, host specificity and vectorial capacity.

CO4: To study the role of Insects as Vectors and detailed features of orders with insects as vectors - Diptera, Siphonaptera, Siphunculata, Hemiptera.

CO5: To study the dipterans as important insect vectors - Mosquitoes, Sand fly, Houseflies.

CO6: To study the different mosquito-borne diseases and their control - Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis.

CO7: To study the different sand fly-borne diseases and their control measures - Leishmaniasis.

CO8: To study the role of house fly as important mechanical vector, Myiasis.

CO9: To study the role of fleas (Siphonaptera) as important insect vectors and their host-specificity.

CO10: To study the different flea-borne diseases and their control measures – Plague, Typhus fever.

CO11: To study the role of different human louse (head, body and pubic louse) - Siphunculata as important insect vectors and their control measures.

CO12: To study the role of bugs (Hemiptera) as insect mechanical vectors and their control and prevention measures – Bed bugs as vectors, Blood-sucking bugs, Chagas disease.

CO13: To develop an understanding about the favourable breeding conditions for the vectors.

CO14: To understand the different control methods of vectors – biological control, chemical control and sterile insect technique.

CO15: To acquire knowledge on the devise strategies to manage the vectors population below threshold levels and public health importance.

CO16: To undertake different preventive measures and start awareness programmes for maintenance of hygienic conditions, avoidance of contact from vector, destruction of breeding spots in the vicinity of houses and cattle shed by public health education campaign.

Title of Course	Insect Vectors and Diseases (MI-2)
Paper Code	MI-2P (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Minor) of Semester-II will acquire the practical knowledge on the identification of different insect vectors through permanent slides and photographs, their mouth parts and different diseases transmitted by them by studying this course.

The practical paper (MI-2P) of this course (MI-2) provides the students with-

CO1: To study the mouth parts of different insects.

CO2: To study different insect vectors through permanent slides/ photographs.

CO3: To study the different diseases transmitted by insect vectors.

CO4: To prepare a project report on any insect vectors and disease transmitted by it.

Semester	II
Title of Course	Aquarium fish keeping SKILL ENHANCEMENT COURSES (SEC 2)
Paper Code	SEC2
Credits	04
Hours	04 hours/week

The students of Zoology (Honours & Major) of Semester-II will acquire a practical knowledge for sustainable ornamental fish farming and will be able to establish a large-scale aquarium fish farm as a cottage industry and to develop entrepreneurship in fish sector by studying this course.

The practical paper (SEC2) of this course (SEC-2) provides the students with-

CO1: To gain knowledge and study the identification about fresh water indigenous and exotic ornamental fishes.

CO2: To study the identification about marine indigenous and exotic aquarium fishes.

CO3: To understand the construction and installation of modern age aquahome.

CO4: To understand about the aquarium plants.

CO5: To understand the basic concept and gain knowledge on aquarium keeping.

CO6: To study the fish feed formation and preparation of pelleted diet for aquarium fishes and live fish food organism for ornamental fishes.

CO7: To gain knowledge on the ornamental fish breeding practice.

CO8: To understand the laws around aquarium keeping.

CO9: To study the different diseases of ornamental fishes.

CO10: To gain knowledge regarding ornamental fish health management practice.

CO11: To provide field exposure and develop understanding about the entrepreneurship in aquarium fish keeping.

CO12: To field visit to an ornamental fish farm and preparation of a field report on aquarium fish keeping to understand and gain knowledge regarding aquarium keeping industry.

Semester	II
Title of Course	Insect vector & disease (MI-02/C1-02)
Paper Code	MI-02T/C1-02T (Theory)
Credits	03
Hours	06 hours/week

The students of Zoology (Pass) of Semester-II will acquire knowledge about an insight into the common vector-borne diseases, their etiology and develop an awareness about the causative agents and control measures of many commonly occurring diseases, role of vectors in their spread, host- parasite relationship and finally the strategies to manage these vectors by studying this course.

The theory paper (MI-02T) of this course (MI-02) provides the students with-

CO1: To study the general and morphological features from head to eyes, types of antennae, mouth parts of insects.

CO2: To study the types of vectors, vector bionomics and morphological peculiarities of different vectors.

CO3: To understand the host-vector relationship, their adaptations as vectors, host specificity and vectorial capacity.

CO4: To study the role of Insects as Vectors and detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera.

CO5: To study the dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies.

CO6: To study the different mosquito-borne diseases and their control – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis.

CO7: To study the different sand fly-borne diseases and their control measures – Leishmaniasis.

CO8: To study the role of house fly as important mechanical vector, Myiasis.

CO9: To study the role of fleas (Siphonaptera) as important insect vectors and their host-specificity.

CO10: To study the different flea-borne diseases and their control measures - Plague, Typhus fever.

CO11: To study the role of different human louse (head, body and pubic louse) - Siphunculata as important insect vectors and their control measures.

CO12: To study the role of bugs (Hemiptera) as insect mechanical vectors and their control and prevention measures - Bed bugs as vectors, Blood-sucking bugs, Chagas disease.

CO13: To develop an understanding about the favourable breeding conditions for the vectors.

CO14: To understand the different control methods of vectors - biological control, chemical control and sterile insect technique.

CO15: To acquire knowledge on the devise strategies to manage the vectors population below threshold levels and public health importance.

CO16: To undertake different preventive measures and start awareness programmes for maintenance of hygienic conditions, avoidance of contact from vector, destruction of breeding spots in the vicinity of houses and cattle shed by public health education campaign.

Title of Course	Insect Vectors and Diseases (MI-02/C1-02)
Paper Code	MI-02P/C1-02 (Practical)
Credits	01
Hours	02 hours/week

The students of Zoology (Pass) of Semester-II will acquire the practical knowledge on the identification of different insect vectors through permanent slides and photographs, their mouth parts and different diseases transmitted by them by studying this course.

The practical paper (MI-02P) of this course (MI-02) provides the students with-

CO1: To study the mouth parts of different insects.

CO2: To study different insect vectors through permanent slides/ photographs.

CO3: To study the different diseases transmitted by insect vectors.

CO4: To prepare a project report on any insect vectors and disease transmitted by it.

