Sidho-Kanho-Birsha University
Zoology (Syllabus)

CC-1

Title: Non-Chordates I: Protists to Pseudocoelomates

Syllabus:

Unit 1: Basics of Animal Classification

1. Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types
2. Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom concept of classification (Carl Woese)

Unit 2: Protista and Metazoa

1. Protozoa
    1. General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion in *Euglena*, *Paramoecium* and *Amoeba*; Conjugation in *Paramoecium*.
    2. Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*
2. Metazoa
    1. Evolution of symmetry and segmentation of Metazoa

Unit 3: Porifera

General characteristics and Classification up to classes; Canal system and spicules in sponges

Unit 4: Cnidaria

1. General characteristics and Classification up to classes
2. Metagenesis in *Obelia*
3. Polymorphism in Cnidaria
4. Corals and coral reef diversity, function & conservation

Unit 5: Ctenophora

General characteristics

Unit 6: Platyhelminthes

1. General characteristics and Classification up to classes
2. Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taenia solium*

Unit 7: Nematoda

1. General characteristics and Classification up to classes
2. Life cycle, and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*
3. Parasitic adaptations in helminthes

Classification for metazoans to be followed from: Rupert and Barnes, 1994, 6th Edition.

List of Practical

1. Identification of *Amoeba*, *Euglena*, *Entamoeba*, *Opalina, Paramecium*, *Plasmodium vivax*

and *Plasmodium falciparum* (from the prepared slides)

1. Identification of *Sycon*, Neptune's Cup, *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatula*, *Fungia*, *Meandrina*, *Madrepora*
2. Identification and significance of adult *Fasciola hepatica*, *Taenia solium* and *Ascaris lumbricoides*
3. Staining/mounting of any protozoa/helminth from gut of cockroach

Reading References:

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.

► Invertebrates by Brusca&Brusca. Second edition, 2002.

CC-2

Title:
Non-Chordates II: Coelomates

Syllabus:
Unit 1: Introduction

Evolution of coelom and metamerism

Unit 2: Annelida

General characteristics and Classification up to classes Excretion in Annelida through nephridia.
Metamerism in Annelida.

Unit 3:Arthropoda

1. General characteristics and Classification up to classes. Vision in Insecta.
2. Respiration in Arthropoda (Gills in prawn and trachea in cockroach)
3. Metamorphosis in Lepidopteran Insects.
4. Social life in termite

Unit 4: Onychophora

General characteristics and Evolutionary significance

Unit 5: Mollusca

1. General characteristics and Classification up to classes
2. Nervous system and torsion in Gastropoda
3. Feeding and respiration in *Pila* sp

Unit 6: Echinodermata

1. General characteristics and Classification up to classes
2. Water-vascular system in Asteroidea
3. Larval forms in Echinodermata
4. Affinities with Chordates

Unit 7: Hemichordata

General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates

Note: Classification to be followed from Rupert and Barnes, 1994, 6th Edition

List of Practical

1. Study of following specimens:
    1. Annelids - *Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus,*

Pheretima, Hirudinaria

1.
    1. Arthropods - *Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta*, termites and honey bees *Onychophora - Peripatus*
    2. Molluscs - *Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia,*

Octopus, Nautilus

1.
    1. Echinodermates - *Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria*

and

1.
    1. *Antedon*
2. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm
3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm
4. Mount of mouth parts and dissection of digestive system and nervous system of

*Periplaneta**

1. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)

Reading References:

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition

► The Invertebrates: A New Synthesis, III Edition, Blackwell Science

CC-3

Title:
Diversity of Chordata

Syllabus:

Unit 1: Introduction to Chordates

General characteristics and outline classification of Phylum Chordata

Unit 2: Protochordata

General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in *Ascidia*. Chordate Features and Feeding in *Branchiostoma*

Unit 3: Origin of Chordata

1. Dipleurula concept and the Echinoderm theory of origin of chordates
2. Advanced features of vertebrates over Protochordata

Unit 4: Agnatha

General characteristics and classification of cyclostomes up to order

Unit 5: Pisces

1. General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses
2. Accessory respiratory organ, migration and parental care in fishes
3. Swim bladder in fishes. Classification up to Sub-Classes

Unit 6: Amphibia

1. General characteristics and classification up to living Orders.
2. Metamorphosis and parental care in Amphibia

Unit 7: Reptilia

1. General characteristics and classification up to living Orders.

1. Poison apparatus and Biting mechanism in Snake

Unit 8: Aves

1. General characteristics and classification up to Sub-Classes
2. Exoskeleton and migration in Birds
3. Principles and aerodynamics of flight

Unit 9: Mammals

1. General characters and classification up to living orders
2. Affinities of Prototheria
3. Exoskeleton derivatives of mammals
4. Adaptive radiation in mammals with reference to locomotor appendages
5. Echolocation in Chiropterans and Cetaceans

Unit 10: Zoogeography

Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms

Note: Classifications for Protochordata, Agnatha, Reptilia, Aves and Mammalia to be followed from Young (1981), for Pisces to be followed from Nelson (1994), for Amphibia to be followed from Duellman and Trueb (1986).

List of Practical

1. Protochordata

Balanoglossus, *Herdmania*, *Branchiostoma*

1. Agnatha

Petromyzon, *Myxine*

1. Fishes

Scoliodon, *Sphyrna*, *Pristis*, *Torpedo*, *Chimaera*, *Mystus*, *Heteropneustes*, *Labeo*, *Exocoetus*, *Echeneis*, *Anguilla*, *Hippocampus*, *Tetrodon*/ *Diodon*, *Anabas*, Flat fish

1. Amphibia

Necturus, Bufo, Hyla, Alytes, Axolotl, Tylototriton

1. Reptilia

Chelone, *Trionyx*, *Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus*. Key for Identification of poisonous and non-poisonous snakes

1. Mammalia: Bat (Insectivorous and Frugivorous), *Funambulus*

2. Pecten from Fowl head
3. Dissection of brain and pituitary of Tilapia
4. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

Reading References:

Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
► Pough H. Vertebrate life, VIII Edition, Pearson International.
► Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
► Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
► Parker, T. J. &Haswell, W. (1972). Text Book of Zoology , Volume II: Marshall and Willam (Eds.) 7th Ed. Macmillan Press,London.
► Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.
► Kent, G. C. & Carr, R. K. (2001). Comparative anatomy of the Vertebrates. 9th Ed.
McGraw Hill.
► Nelson, J.S., (2006) : Fishes of the World, 4th Edn., Wiley.
► Romer, A. S. & Parsons, T. S. (1986). The vertebrate body. 6th Ed. Saunders College Publishing.
► Jordan, E.L. &Verma, P.S. (2003). Chordate Zoology. S. Chand & Company Ltd. New Delhi.
► Sinha, K. S., Adhikari, S., Ganguly, B. B. &BharatiGoswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.
Futuyama, D. (1997). Evolutionary Biology. 3rd Ed. Sinauer Associates, INC.

CC-4

Title:
Comparative Anatomy of Vertebrates

Syllabus:

Unit 1: Integumentary System

Structure, function and derivatives of integument in amphibian, birds and mammals

Unit 2: Skeletal System

Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches.

Unit 3: Digestive System

Comparative anatomy of stomach; dentition in mammals

Unit 4: Respiratory System

Respiratory organs in fish, amphibian, birds and mammals

Unit 5: Circulatory System

General plan of circulation, Comparative account of heart and aortic arches

Unit 6: Urinogenital System

Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri

Unit 7: Nervous System

Comparative account of brain, Cranial nerves in mammals

Unit 8: Sense Organs

Classification of receptors, Brief account of auditory receptors in vertebrate

List of Practical

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs

2. Study of disarticulated skeleton of Toad, Pigeon and Guineapig
3. Demonstration of Carapace and plastron of turtle
4. Identification of mammalian skulls: One herbivorous (Guineapig) and one carnivorous (Dog) animal
5. Dissection of Tilapia: Digestive system, Brain, Pituitary, Urinogenital system

Reading References:

Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution.
IV Edition. McGraw-Hill Higher Education
Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies
Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons Saxena, R.K. &Saxena, S.C.(2008) : Comparative Anatomy of Vertebrates, Viva Books Pvt.

SEC-1

Title:

Aquarium Fish Keeping

Syllabus:

Unit 1: Introduction to Aquarium Fish Keeping

The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish

Unit 3: Food and feeding of Aquarium fishes

Use of live fish feed organisms. Preparation and composition of formulated fish feeds, Aquarium fish as larval predator

Unit 4: Fish Transportation

Live fish transport - Fish handling, packing and forwarding techniques.

Unit 5: Maintenance of Aquarium

General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

Reading References:

SEC-2

Title:
Sericulture

Syllabus:

Unit 1: Introduction

1. Sericulture: Definition, history and present status; Silk route
2. Types of silkworms, Distribution and Races
3. Exotic and indigenous races
4. Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm

1. Life cycle of *Bombyx mori*
2. Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms

1. Selection of mulberry variety and establishment of mulberry garden
2. Rearing house and rearing appliances.
3. Disinfectants: Formalin, bleaching powder, RKO
4. Silkworm rearing technology: Early age and Late age rearing
5. Types of mountages
6. Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases

1. Pests of silkworm: Uzi fly, dermestid beetles and vertebrates
2. Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial
3. Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture

1. Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture
2. Visit to various sericulture centres.

Reading References:

SEC-3

Title:

Medical Diagnostic Techniques

Syllabus:

Unit 1: Introduction to Medical Diagnostics and its Importance

Unit 2: Diagnostics Methods Used for Analysis of Blood

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit 3: Diagnostic Methods Used for Urine Analysis

Urine Analysis: Physical characteristics; Abnormal constituents

Unit 4: Non-infectious Diseases

Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Unit 5: Infectious Diseases

Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis, Malarial parasite (Microscope based and ELISA based)

Unit 6: Clinical Biochemistry

LFT, Lipid profiling

Unit 7: Clinical Microbiology

Antibiotic Sensitivity Test

Unit 8: Tumours

Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Reading References:

Park, K. (2007), Preventive and Social Medicine, B.B. Publishers

► Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House

► Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
► Guyton A.C. and Hall J.E. Textbook of Medical Physiology, Saunders
► Robbins and Cortan, Pathologic Basis of Disease, VIII Edition, Saunders
► Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SEC-4

Title:

Apiculture

Syllabus:

Unit 1: Biology of Bees

1. History, Classification and Biology of Honey Bees
2. Social Organization of Bee Colony

Unit 2: Rearing of Bees

1. Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth
2. Bee Pasturage
3. Selection of Bee Species for Apiculture
4. Bee Keeping Equipment
5. Methods of Extraction of Honey (Indigenous and Modern)

Unit 3: Diseases and Enemies

1. Bee Diseases and Enemies
2. Control and Preventive measures

Unit 4: Bee Economy

Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture

Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens

Reading References:

Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.

► Bisht D.S., Apiculture, ICAR Publication.

► Singh S., Beekeeping in India, Indian council of Agricultural Research, NewDelhi.

DSE-1

Title:

Wild Life Conservation and Management

Syllabus:

Unit 1: Introduction to Wild Life

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

Unit 2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation Standard evaluation procedures: remote sensing and GIS.

Unit 3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity Restoration of degraded habitats

Unit 4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

Unit 5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation

Unit 6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.

Unit 7: Man and Wildlife

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population

Unit 8: Protected areas

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

List of Practical

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

Reading References:

Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

► Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Co- existence? Cambridge University.

► Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.

► Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy.
Blackwell Sciences

► Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

DSE-1

Title:
Fish and Fisheries

Syllabus:
Unit 1: Introduction and Classification

1. General description of fish
2. Feeding habit, habitat and manner of reproduction
3. Classification of fish (up to Subclasses)

Unit 2: Morphology and Physiology

Types of fins and their modifications; Locomotion in fish; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in Elasmobranchs; Reproductive strategies (special reference to Indian fish); Electric organ, Bioluminescence

Unit 3: Fisheries

Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations

Unit 4: Aquaculture

Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products

Unit 5: Fish in research

Transgenic fish, Sex reversal
Note: Classification to be followed from: Nelson (2004)
List of Practical

1. Morphometric and meristic characters of fishes

2. Study
   of *Petromyzon*, *Myxine*, *Pristis*, *Chimaera*, *Exocoetus*, *Hippocampus*, *Gamb usia*, *Labeo*, *Heteropneustes*, *Anabas*
3. Study of different types of scales (through permanent slides/ photographs).
4. Study of crafts and gears used in Fisheries
5. Water quality criteria for Aquaculture: Assessment of pH, Conductivity, Turbidity, Alkalinity, Salinity
6. Study of air breathing organs
   in *Channa*, *Heteropneustes*, *Anabas* and *Clarias*
7. Project Report on a visit to any fish farm/ pisciculture unit.

Reading References:

Q Bone and R Moore, Biology of Fishes, Talyor and Francis Group, CRC Press, U.K.

► D. H. Evans and J. D. Claiborne, The Physiology of Fishes, Taylor and Francis Group, CRC Press, UK von der Emde, R.J. Mogdans and B.G. Kapoor.The Senses of Fish: Adaptations for the Reception of Natural Stimuli, Springer, Netherlands

► C.B.L. Srivastava, Fish Biology, Narendra Publishing House

► J.R. Norman, A history of Fishes, Hill and Wang Publishers

► S.S. Khanna and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing House

DSE-2

Title:
Parasitology

Syllabus:
Title

Parasitology
Syllabus:
Unit 1: Introduction to Parasitology: Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship
Unit 2: Parasitic Protists: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani*

Unit 3: Parasitic Platyhelminthes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Schistosoma haematobium*, *Taenia saginata*
Unit 4: Parasitic Nematodes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Ascaris lumbricoides*, *Ancylostoma duodenale*.
Unit 5: Parasitic Arthropods: Biology, importance and control of ticks (Soft tick *Ornithodoros,* Hard tick *Ixodes*), mites (*Sarcoptes*), Lice (*Pediculus*), Flea (*Xenopsylla*) and Bug (*Cimex*)
Unit 5: Parasite Vertebrates: Brief account of Cookicutter Shark, Hood Mocking bird, Vampire bat
List of Practicals

1. Study of life stages of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani*through permanent slides/micro photographs.
2. Study of adult and life stages of *Schistosoma haematobium*, *Taenia sajinata*through permanent slides/micro photographs
3. Study of adult and life stages of *Ancylostoma duodenale*, *Brugiamalayi*and *Trichinella spiralis* through permanent slides/micro photographs
4. Immunopathology of Malaria and Filaria
5. Study of plant parasitic root knot nematode, Meloidogyne from the soil sample
6. Study of *Pediculus humanus*, *Xenopsyllacheopis*and *Cimexlectularius*through permanent slides/ photographs
7. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]

8. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product
    1. Submission of a brief report on parasitic vertebrates

Reading References:

Reading References:

Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors

E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition,Lea &Febiger

Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group

Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi

Rattan Lal Ichhpujani and Rajesh Bhatia. Medical Parasitology, III Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi

Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers

K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS

DSE-2

Title:
Animal Behavior & Chronobiology

Syllabus:
Title:
Animal Behaviour and Chronobiology: BZOODSRC4
Syllabus:
Unit 1: Introduction to Animal Behaviour: Origin and history of Ethology, Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen
Proximate and ultimate causes of behaviour, Methods and recording of a behaviour
Unit 2: Patterns of Behaviour: Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.
Unit 3: Social and Sexual Behaviour: Social Behaviour: Concept of Society; Communication and the senses, Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.Parental care in fish and amphibian, Parent-offspring conflict.
Unit 4: Introduction to Chronobiology: Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and periodAdaptive significance of biological clocks
Unit 5: Biological Rhythm: Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Circannual rhythms; Photoperiod and regulation of seasonal reproduction of vertebrates; Role of melatonin.
List of Practical
To study nests and nesting habits of the birds and social insects.

1. To study the behavioural responses of wood lice to dry and humid conditions.
2. To study geotaxis behaviour in earthworm.
3. To study the phototaxis behaviour in insect larvae.
4. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.
5. Study and actogram construction of locomotor activity of suitable animal models.
6. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

Reading References:
Reading References:

- Animal Behaviour by Drickamar.
- John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.

- Paul W. Sherman and John Alcock, Exploring Animal Behaviour, Sinauer Associate Inc., Massachusetts, USA.
- Chronobiology Biological Timekeeping: Jay. C. Dunlap, Jennifer. J. Loros, Patricia J. DeCoursey (ed). 2004, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA
- Insect Clocks D.S. Saunders, C.G.H. Steel, X., Afopoulou (ed.)R.D. Lewis. (3rdEd) 2002 Barens and Noble Inc. New York, USA
- Biological Rhythms: Vinod Kumar (2002) Narosa Publishing House, Delhi/ Springer-Verlag, Germany.