COURSES OF STUDIES

For

2007-2008

MASTER OF SCIENCE

ZOOLOGY

RAVENSHAW UNIVERSITY

CUTTACK

P.G- I

1st Semester

Theory

Paper - I (ZO-1.1.1)

Taxonomy, Chemical Foundation of Biology, Cell biology

FM- 50 **Time: 3 Hrs.**

UNIT - I Biosystematics and Taxonomy

Definition & basic concepts of biosystematics. Historical resume of systematics. Importance and application of biosystematics in biology, Numerical taxonomy, cytotaxonomy, molecular taxonomy.

Species concept - Species category, different species concept.

Taxonomic procedure, taxonomic collection, preservation, curetting, process of identification.

International code of zoological nomenclature (ICZN), its operative principle, formation of scientific names of various taxa.

UNIT - II Chemical Foundation of biology

Atomic bonds & molecular interaction : Weak bonds convalent bonds, PH, Pk, Acid-base balance, Buffers Bioenergetics : Laws of thermodynamics, Free energy, Standard free energy, free energy change.

Classes of organic compounds as functional groups - molecular dimensions

UNIT -III Cell biology

Biomembranes-Structure and Molecular composition of plasma membrane, structure & function of ER, Golgi, Lysosome. Transport of nutrients, ions, macro-molecules across membrane. Signalling system - cell-cell adhesion & communication.

Paper - II (ZO-1.1.2)

Animal Diversity - I : Invertebrates, Microbiology

FM- 50 **Time: 3 Hrs.**

UNIT - I

Introduction to non-chordates.

Salient features of protozoa

Locomotion in protozoa

Nutrition in protozoa

Parasitic protozoans of man

(Entamoeba, Giardia, Trypanosoma)

Salient features of porifera

Canal system in porifera

Reproduction in porifera.

Salient features in coelentarate.

Polymorphisms in coelenterata

Coral and coral reefs

Salient features of Platyehelminthes, Nematohelminthes.

Parasitic adaptation in Helminthes.

Study of Ascaris with reference to life cycle.

UNIT - II

Salient features of Annelida

Coelom in Annelida

Excretory system in Annelida

Salient features of Arthropoda

Larval forms in crustacea

Mouth parts in insects

Salient features of Mollusca

Torsion in Gastropoda

Respiration in mollusca

Salient features of Echinodermata

Water vascular system in echinodermata

Larval forms in Echinodermata

UNIT - III

Discovery of microbial world, role of microorganism

Bacterial genetic system - Transformation, Conjugation, Transduction, Recombination.

Plasmids, Transposons, Bacterial genetic map.

Virus and their genetic system.

Paper - III (ZO-1.1.3)

Evolution, Nuclear Cytology

FM- 50 **Time: 3 Hrs.**

UNIT-I Evolution

Concept of Organic evolution

Evidences in support of organic evolution- (Morphological, Anatomical, Embryological)

Theories of evolution (Lamarck, Darwin) .

Origin of life

Gene evolution. Evolution of gene families

UNIT - II

1. Hardy Weinberg's law & genetic equilibrium
2. Destabilizing forces :

   (a) Mutation

   (b) Genetic drift and allelic fixation

   (c) Natural selection

   (d) Migration

   (e) Species concept patterns, Mechanism of Isolation
3. Genetics of speciation

UNIT - III

Structure of interphase nucleus

DNA - Stability and variability (the C-value paradox)

Structure of chromosome

Chromosomal alterations (Structural and numerical) and evolution, Nucleosome

Cell Cycle, Mitosis & Meiosis, Cell cycle control, Programmed cell death.

Paper - IV (ZO-1.1.4)

(Practical)

Taxonomy, Invertebrates, Benefical Insects, Microbiology

FM- 50 **Time: 6 Hrs.**

1. Taxonomic identification of locally avaliable fish and insects.
2. Culture of Paramecium, Euglena, Hydra, Amoeba. Study of behaviour of paramecium to different environmental stress.
3. Observation of rectal ciliates and their microscopic preparation.
4. Study of museum specimens of phylum Porifera, Coelenterata, Helminthes, Annelida and Arthropoda.

5. Study of slides from Phylum Protozoa, Porifera Coelenterata, Helminthes, Annelida and Arthropoda.
6. Identification of Gram +ve and Gram - ve bacteria.
7. Microscopic examination of bacteria, yeast and moulds.
8. Study of life cycles of beneficial insects
   (a) Honey Bee
   (b) Lac Insect
   (c) Silk Insect

Paper - V (ZO-1.1.5)

(Practical)

Nuclear Cytology, Genetics, Invertebrates

FM- 50 **Time: 6 Hrs.**

1. Determination of Ph and Pk value of different solutions.
2. Temporary and Permanent preparation of chromosomes of grasshopper and onion 200+ tip by squashing technique.
3. Camera lucida diagram of prepared chromosomes and preparation of karyotype of grasshopper.
4. Problem in Genetics
5. Study of museum specimens and slides : phylum mollusca, Echinodermata and minor phyla.
6. Culture of Drosophila, its life cycle and study of different genetic characters.

Suggested Reading

1st Semester.

1. Invertebrate structure - Barrington, E.J.W. - Nelson, London
2. The Invertebrates Vol.-I to VI, - Hyman L.H - Mc. Graw Hill, New York, USA
3. Protozoology - R.R. Kudo - Thomas Springfield Illinois, U.S.A.
4. A Text Book of Zoology Vol.-I, - Parker, T.J and Haswell W.A - Macmillan London.
5. Biology of Animals - Sinha, Adhikari and Ganguli - New Central Book Agency, Calcutta.
6. Protozoa to Echinodermata - R.L. Kotpal - Rastogi Publ.
7. Lehninger Principle of Biochemistry - Nelson and Cox - Palgrave Freeman
8. Biochemistry - D. Voet and J.G. Voet - J. Wiley and Sons
9. Microbiology - Pelezar, Chan and Kreig - Tata Mcgraw Hill.
10. Molecular Cell Biology - Lodish et. al - W.H. Freeman.
11. Genes VII - B. Lwein - Oxford Univ.
12. Elements of Taxonomy - E. Mayer
13. Principle of animal Taxonomy - G.G. Simpson - Oxford, IBH
14. Evolution - Paul S.Moody - Kalyani Publ.
15. Genetics and Origin of Species - Th. dobzhansky - Columbia University press.

16. Genes and Evolution - A.P. Jha - John Willey Publication.
17. Evolution - M.W. Strikberger - Jones Bartett Publication.
18. Chromosomes Organizationand Function - A.T. Sumner - Blackwell Publication.
19. Chromosomes 3rd Edn. - Archana Sharma - Oxford IBH Publication.
20. Biochemistry - L. Stryer - Freeman.
21. The Cell - G.M. Cooper.

PG - I

2nd Semester

Paper - VI (ZO-1.2.6)

Protochordates and Animal Diversity - II

(Chordata) Molecular Biology

FM- 50 **Time: 3 Hrs.**

UNIT - I

Origin and general characters of chordates, affinities of Chordates. Protochordates : Salient features of Herdmania, Balanoglossus, Amphioxus Interrelationship among protochordates

Cyclostomes : Salient features & affinities

Fishes - Origin & evolution, salient features, parental care, migration

UNIT - II

Amphibia - Origin & evolution salient features, parental care

Reptiles - Origin, Salient features, Extinct reptiles

Aves - Salient features, Flight Adaptation, origin of birds, migration.

Mammalia - General characters, origin, Affinities of prototheria and metatheria

UNIT - III

DNA replication & repair :

DNA replication - DNA polymerases, Mechanism of DNA replication.

Enzymes involved in DNA modification, demethylases, DNA ases, DNA gyrase, Topo isomerase

DNA repair : DNA recombination, Holiday Junction, one strand break, Two - strand breaks, Rec, A Protein, Cre/Ioxo, Site specific recombination.

Transcription - Prokaryotic & Eukaryotic, Reverse transcription.

Antisense Ribozyme technology - molecular mechanism of antisense molecule, Biochemistry of ribozyme.

Paper -VII (ZO-1.2.7)

Endocrinology Environmental Biology

FM- 50 **Time: 3 Hrs.**

UNIT - I

Aim and scope of Endocrinology

Endocrine glands : Pituitary, Thyroid, Adrenal, Pancreas, Gonads

Hormone as messenger

Hormone, Classification Chemical nature and functions

Evolution of protein hormones and their receptors

Hormones in eukaryotic metabolic regulation

Hormones and Behaviour

Biosynthesis of Epinephrine, Thyroxine, Steroid hormone

UNIT - II

Interspecific interactions, Competition and co-existance

Mutualism, Parasitism, Predation

Population ecology : Population size, density, Regulation of growth Controls of Population size

UNIT - III

Adaptation

Mechanism of adaptation

Physiological and morphological adaptations to different

environments : Marine, Fresh water, Terrestrial, Parasitic

Environmental pollution : Cause, effect and control mesure of air, water, land and noise pollution. Effect of abiotic environmental factors : temperature and light on animals

Paper - VIII (ZO-1.2.8)

Biomolecules, Metabolic pathways, Synthesis/Regulation

FM- 50 **Time: 3 Hrs.**

UNIT - I

Biomolecules

Monosaccharides - Classification, structure, polysaccharides - Types, structural features.

Aminoacids - Classification, properties

Proteins - Classification, structures, functions.

Lipids - Classification, structures, functions

Nucleic acids - Structural chemistry.

Prostaglandins - structure, function

UNIT - II

Metabolic pathways

Glycolysis, Anaerobic glycolysis, Krebs cycle, ET Chain, oxidative phosphorylation and ATP generation,

Hexose monophosphate shunt

β (beta) - oxidation of palmitic acid

Decarboxylation, Transamination, transmethylation, Deamination

UNIT - III

Synthesis and regulation

Synthesis of proteins in Pro- & Eukaryotes, Glycogen, Triglycerides, Fatty acids Phospholipids, Cholesterol, and Prostaglandin

Coordinated regulation of Glycolysis and Gluconeogenesis.

Regulation of Metabolic pathways

Paper - IX (ZO-1.2.9)

(Practical)

Chordates, Endocrinology, Histology

FM- 50 **Time: 6 Hrs.**

1. Study of museum specimes and slides of protochordates.
2. Study of museum specimes of class Pisces, Amphibia, Reptilia, Aves and mammals.
3. Microtomy of tissues of frog and Rat/Mice.
4. Study of slides of endocrine glands.
5. Dissection of piluitary gland of frog/fish.

Paper - X (ZO-1.2.10)

(Practical)

FM- 50 **Time: 6 Hrs.**

1. Determination of oxygen content of water samples from different sources by Winkler's method.
2. (i) Study of population of nematodes/ arthropods in soil sample.

   ii) Analysis of soil texture, moisture content, porocity.
3. Qualitative study of Biomolecules.
4. Separation of amino-acids by paper chromatographic method.
5. Study of models of DNA structure and replication.
7. Growth of organisation in heavily and less polluted water.

Paper - XI (ZO-1.2.11)

FM- 100

SEMINAR

Suggested Reading

2nd Semester.

1. The Life of Vertebrates - J.Z. Young - Oxford University Press, London.

2. The Vertebrate Story - A.S. Romer - University of Chicago.
3. Biology of Animals - Sinha, Adhikari and Ganguli - New Central Book Agency. Calcutta.
4. Lenninger Principle of Biochemistry - Nelson and Cox - Palgrave Freeman.
5. Cell and Molecular Biology - De Robertis - Saunders.
6. General Endocrinology - Bagnara and Turner - W.B. Saunders.
7. Comparative Vertebrate Endocrinology - P.J. Bentley - Cambridge University Press.
8. General And Comparative animal physiology - Hoar, W.S - Prentice Hall of India.
9. Molecular Biology of the Cell - B. Alberts et. al. - Scientific American Book.
10. Genome - 3, - T.A. Brown - G.S. Publication.