

**GULBARGA UNIVERSITY
GULBARGA**



SYLLABUS

for

M.Sc.

ZOOLOGY

(CHOICE BASED CREDIT BASED SYSTEM)

2011 ONWARDS

Proceedings of the Meeting of the Board of Studies in Zoology held on 04th August, 2011 to prepare Credit Based Choice Based Syllabus for M.Sc. Zoology Course for the Academic year 2011-12 onwards.

Members Present:

- | | |
|----------------------------|-----------------|
| 1. Prof. K.Vijaykumar | Member |
| 2. Prof. Ravindra Paul | Member |
| 3. Prof. R. S. Kulkarni | Chairman, BOS |
| 4. Dr.Murali Jadesh | Member |
| 5. Prof. M.Venkateshwerulu | External Member |
| 6. Prof. P.M.Basha | External Member |
| 7. Prof. S. Ramakrishna | External Member |

1. The CBCS syllabus for the M.Sc. Zoology course was drafted after several deliberations and discussions during the meetings of the Departmental Council and placed in the Meeting of the Board of Studies in Zoology for approval and implementation from the academic year 2011-2012 and onwards (copy enclosed).
2. It was unanimously decided that the practical courses covering the theory papers mentioned in the scheme of teaching and examinations be evolved by the teacher(s) concerned during beginning of the every academic year.
3. Each candidate shall undertake compulsory “Animals in Nature” **Study Tour** covering different Institutions and natural biomes with a stress on Biodiversity study. The duration of this Tour shall be about 10 days. The Study Tour shall be undertaken during third Semester only.

Scheme of Teaching and Examination 2012-13

| Semester | Paper No & Title | Teaching Hrs / week | Exam. Hrs. | Examination | Internal Assessment | Credits |
|---|--|----------------------------------|------------|-------------|---------------------|-----------|
| <i>I</i> | HCT-1.1: Animal Systematics | 04 | 03 | 80 | 20 | 04 |
| | HCT-1.2: Biology of Non-Chordates | 04 | 03 | 80 | 20 | 04 |
| | HCT-1.3: Molecular Cell Biology | 04 | 03 | 80 | 20 | 04 |
| | SCT-1.1: (I):Computer Applications and Methods in Biology/Or (II):Aquatic Biology | 04 | 03 | 80 | 20 | 04 |
| | HCP-1.1: Practical based on 1.1 | 04 | 03 | 40 | 10 | 02 |
| | HCP-1.2 Practical based on 1.2 | 04 | 03 | 40 | 10 | 02 |
| | HCP-1.3: Practical based on 1.3 | 04 | 03 | 40 | 10 | 02 |
| | SCP-1.1: Practical based on 1.1 | 04 | 03 | 40 | 10 | 02 |
| | <i>II</i> | HCT-2.1: Biology of Chordates | 04 | 03 | 80 | 20 |
| HCT-2.2: Developmental Biology | | 04 | 03 | 80 | 20 | 04 |
| SCT-2.1: (I):Molecular Genetics Or (II):Wildlife Biology & Conservation | | 04 | 03 | 80 | 20 | 04 |
| OET-2.1: Human Physiology | | 04 | 03 | 80 | 20 | 04 |
| HCP-2.1: Practical based on 2.1 | | 04 | 03 | 40 | 10 | 02 |
| HCP-2.2: Practical based on 2.2 | | 04 | 03 | 40 | 10 | 02 |
| SCP-2.1: Practical based on 2.3 | | 04 | 03 | 40 | 10 | 02 |
| OEP:2.1 Practical based on 2.4 | | 04 | 03 | 40 | 10 | 02 |
| <i>III</i> | | HCT-3.1: Biology of Reproduction | 04 | 03 | 80 | 20 |
| | HCT-3.2: Animal Physiology | 04 | 03 | 80 | 20 | 04 |
| | SCT-3.1: (I):Environmental Biology Or (II):Evolutionary Biology | 04 | 03 | 80 | 20 | 04 |
| | OET-3.1: Applied Zoology | 04 | 03 | 80 | 20 | 04 |
| | HCP3.1: Practical based on 3.1 | 04 | 03 | 40 | 10 | 02 |
| | HCP3.2: Practical based on 3.2 | 04 | 03 | 40 | 10 | 02 |
| | SCP3.1: Practical based on 3.3 | 04 | 03 | 40 | 10 | 02 |
| | OEP3.1: Practical based on 3.4 | 04 | 03 | 40 | 10 | 02 |
| | <i>Compulsory field visit & Study Tour of about 10 days period be undertaken during III semester. Candidate has to submit the detailed tour report along with 3.6 Examination.</i> | | | | | |
| <i>IV</i> | HCT-4.1: Biodiversity | 04 | 03 | 80 | 20 | 04 |
| | HCT-4.2: Animal Behaviour | 04 | 03 | 80 | 20 | 04 |
| | HCT-4.3: Project | 04 | 03 | 100 | - | 04 |
| | SCT-4.1:(I):Endocrinology Or (II):Parasitology | 04 | 03 | 80 | 20 | 04 |
| | HCP4.1: Practical based on 4.1 | 04 | 03 | 40 | 10 | 02 |
| | HCP4.2: Practical based on 4.2 | 04 | 03 | 40 | 10 | 02 |
| | HCP4.3: Presentation, Colloquium & Viva | 04 | 03 | 40 | 10 | 02 |
| | SCP4.1: Practical based on 4.4 | 04 | 03 | 40 | 10 | 02 |
| Total Marks (I to IV Semester) 2400 | | | | | | 96 |

***4.3: HCT: Project Commences from the beginning of III semester-**

HC: Hard Core; SC: Soft Core OE: Open Elective

Paper: HCT-1.1: ANIMAL SYSTEMATICS

64 hrs

Unit -I:

Introduction to Science of taxonomy, Principles of taxonomy, History of biological Classification, Taxonomy as Science and Profession. (6)

Unit -II:

Theories of biological classification. Species concepts. Hierarchy of Categories and Higher taxa. (6)

Unit -III:

(a) Taxonomic Procedures: taxonomic collections, preservation, enrating, cataloging, identification. (6)

(b) Taxonomic characters; Procedure of classification. (4)

(c) International Code of Zoological Nomenclature (ICZN); Interpretation of Rules of Nomenclature (in Brief). (4)

(d) New trends in taxonomy: Cladistics, Phenetics. (4)

Unit – IV:

(a) General characters and classification of invertebrate phyla (Protozoa to Echinodermata). (12)

(b) General characters and classification of Minor phyla (6)

Unit –V

(a) General characters and classification of Protochordata (2)

(b) General characters and classification of Chordata (10)

Unit -VI:

(a) Phylogenetic interrelationship between major invertebrate phyla. (2)

(b) Phylogenetic interrelationship between Protochordates and chordates. (2)

References:

1. Ernest Mayr. 1997. Principles of systematic Zoology. Tata-McGraw-Hill, New Delhi.428 pp.
2. Simpson, G.G.1961. Principles of animal Taxonomy. Columbia University Press, new York.247 pp.
3. Barnes, R.D.1968. Invertebrate Zoology.IIEd. Saunders, Philadelphia.
4. Barrington, E.J.W.1967. Invertebrate Structure and Function, Nelson, London.

Paper: HCT-1.2- BIOLOGY OF NON-CHORDATES

64 hrs

| | | |
|-----------------|---|------|
| Unit-I | Locomotion | (10) |
| | Principles of hydrostatic movements, Amoeboid and flagellar movements and Locomotion in Arthropods | |
| Unit-II | Nutrition and Digestion | (12) |
| | Food and feeding habits of non-chordates, Filter feeding in Polychaeta, Mollusca and Echinodermata, Symbiotic nutrition | |
| Unit-III | Respiration and Excretion | (12) |
| | Organs of respiration: Gills, trachea and Lungs, Respiratory pigments, Mechanisms of respiration, Organs of excretion- Coelomoducts, Nephridia, malphigian tubules, Coxal glands and mechanism of excretion | |
| Unit-IV | Nervous system: | (10) |
| | Primitive nervous system: Coelenterata and Echinodermata, Advanced nervous system: Annelida, Arthropoda (Crustacea and Insecta) and Mollusca (Cephalopod), Sense organs and their importance | |
| Unit V | Reproduction | (10) |
| | Patterns of reproduction in invertebrates, Larval forms of free living, Larval forms of parasites | |
| Unit VI | Minor Phyla | (10) |
| | General characters and affinities of Chaetognatha, Ctenophora, Phoronida and Pogonophora | |

References:

1. Barrington. E J W. 1967. Invertebrate structure and function, Nelson, London.
2. Barnes, R. D 1968. Invertebrate Zoology, 2nd Ed. Saunders, Philadelphia.
3. Hyman L H. 1940-67. The Invertebrates, Vol. I-VI. McGraw-Hill, New York.
4. Russell-hunter. W D. 1968. Biology of lower invertebrates, Macmillan Company, New York.
5. Marshall, A.J and Williams, W D (Eds). 1995. Text book of Zoology-Invertebrates. VII Ed., Vol. I, A.L.T.B.S. Publishers.

Paper: HCT-1.3- MOLECULAR CELL BIOLOGY

64 hrs

Unit-I

(5)

Introduction to molecular cell biology: Levels of organization. Cell as a morphologic and functional unit within organisms. The central dogma of molecular biology. The scope of modern cell biology. Synthetic biology.

Unit-II

(10)

Biochemistry of cell: Chemical components of the cell- (a) Water, salts, ions and their properties, (b) Proteins - primary, secondary and tertiary structures. Peptide bond formation, (c) Carbohydrates - Complex polysaccharides and glycoproteins, (d) Lipids - triglycerides and compound lipids and (d) Nucleic acid - A pentose, Phosphate and four Bases. Nucleotides, double helix formation. Structure of single and double stranded RNA.

Unit -III

(6)

Structure of eukaryotic chromatin. Chromosomal condensation during mitosis. Heterochromatin Chromosomal nomenclature - chromatid, centromere, kinetophore, telomere, telomerase, satellite, secondary constriction, nucleolar organizer.

Unit-IV

(10)

Genome organization - hierarchy in organization. Structure of Gene. Gene transcription. Post-transcriptional processing of RNA. Reverse transcription. Structure of introns, exons. RNA Interference. Genetic code and genetic engineering: Triplet code, mutations and genetic code. DNA sequencing. Genetic engineering.

Unit -V

(8)

Biomembranes: Molecular organization. Transport across cell membrane. Cell to cell communication and recognition. Modifications of membranes: Gap junctions and tight junctions, Membrane receptors, ion channels, gated channels.

Unit-VI

(10)

Molecular organization and functions of membrane orgnaelles: endoplasmic reticulum, microsomes, golgi complex, lysosomes, peroxisomes, mitochondria and chloroplast. Molecular organization and function of cytoskeletal structures: Microfilaments, microtubules, cilia and flagella.

Unit-VII

(4)

Cell cycle: Molecular events during different stages of cell cycle - cyclins and cyclin dependent kinases. Regulation of CDK cyclin activity.

Unit-VIII (6)

Cell aging: Biology of aging. Molecular biology of cancer cell- carcinogenesis.
Apoptosis: mechanism and significance.

Unit-IX (5)

Cellular and molecular basis of immunity: Types of immune response. Genetic control of immune function. Immunology as a tool in biology and medicine.

References:

1. Alberts, B., Bray Dennis, Lewis Julian, Raff Martin, Roberts. K and Watson, J.D. Molecular Biology of the Cell. Garland Publishing Inc. New York, 1994.
2. Cellis, J.E. Cell Biology: a Laboratory Handbook Vol. I and II. Academic Press, 1998.
3. Lodish, H., Berk, A., Zipuosky, L.S., Matsudaira, P., Baltimore, D & Darnell, J. Molecular Cell Biology IV Ed. W.H. Freeman & Co. 2001.
4. Malacinski, G.M & Freifelder, D. Essentials of Molecular Biology III Ed. Jones & Bartlett Publishers, 1998.

Paper: SCT-1.4- (I) COMPUTER APPLICATIONS AND METHODS IN BIOLOGY**64 hrs****Unit-I** (5)

Computer hardware and soft wares. General maintenance of computer systems. Operating systems. Programming languages. Bioinformatics.

Unit-II (8)

Computers assisted teaching (CAT) and labs: Integrations ICT in teaching learning, virtual learning resources. Computer simulation of physiological processes. Molecular modeling, Image analysis. Computer interfacing with equipments, microscopes. Scanning and micrometric analysis. Biotelemetry.

Unit-III (4)

Data processing and plotting, Excel, presentations and drawings. Power point and word processors. Corel Draw.

Unit-IV (6)

Networking. Access to Internet: dialup, leased line, cable and *wifi* connections. Internet browsers, search engines and information retrieval. Cloud computing.

Unit-V (12)

Microscopy: Light, phase contrast, dark - field fluorescence. Electron microscopy - transmission and scanning. Histological and histochemical staining techniques.

Unit-VI (4)

Cell and tissue culture: types of culture, cell lines and culture media. Contact inhibition of Growth. Immuno-fluorescence and vital stains.

Unit-VII (10)

Separation techniques and instrumentation: Chromatography and gel filtration. Electrophoresis and electro-focusing. Cell fractionation, gradient centrifugation and sub-cellular fractions. Spectroscopy- UV and visible, Raman and atomic absorption. Cytophotometry, Flow cytofluorimetry- Cell sorting.

Unit-VIII (6)

Radioisotopes and tracer techniques: Definition and properties of radioisotopes. Units of measurement of radioactivity. Autoradiography and its utility. Radioimmunoassays, radiometric enzyme assays. Liquid scintillation counters.

Unit-IX

(5)

Care and handling of laboratory animals. Committee for the purpose of control and supervision of experiments on animals (CPCSEA). Alternatives for use of animals for laboratory experiments to prevent vivisection.

Unit-X

(4)

Writing of science report/paper. Bibliography. Citations index and impact factors. Microphotography, micrometry and field photography. Biostatistics: Mean, standard deviation/error, t-test, analysis of variance (ANOVA) and significance value.

References:

1. Young, S. S. Computerized data acquisition & Analysis for life Sciences: A Hands-on guide. Cambridge University Press, 2001.
2. Snedecor ,G.W and Cochran, W.G. Statistical Methods. Ed VI. Oxford and IBH Publishing co, New Delhi, 1967.
3. Higgins, D & Taylor, W (Eds). Bioinformatics Sequence, Structure. Chapman & Hall, 1995.
4. Bailey, N.T.J. Statistical Methods in Biology-III Ed. Cambridge University Press, 1995.
5. John, R.W.M. Ed. Animal Cell Culture- A practical approach. IRL Press.
6. Robert Brown. Introduction to instrumental analysis. McGraw Hill International Editions.
7. Wilson, K & Goulding, K.H. A Biologists Guide to Principles and Techniques of Practical Biochemistry. ELBS Ed.

Paper: SCT-1.4- (II) AQUATIC BIOLOGY

Maximum : 64 Hours

| | |
|---|----------|
| Unit-I: | 04 hours |
| Introduction to Aquatic Biology and Concepts | |
| Unit-II: | 06 hours |
| Physical Characteristics of Water: light, temperature,Electrical Conductivity, turbidity, density, pressure | |
| Unit-III: | 10 hours |
| Chemical properties of water: Hydrogen-ion-concentration Dissolved oxygen, free carbondioxide, total alkalinity, yotal hardness,chloride, sulphate, nitrate-nitrite, phosphate-phosphorus, BOD, COD,NOD | |
| Unit-IV: | 08 hours |
| Rivers and Lakes: origins and morphometry, thermal stratification | |
| Unit-V: | 10hours |
| Biological communities of lakes and rivers: Phytoplankton, periphyton, Zooplankton, benthos, microphytes, insects, mollusca, amphibians, fish and birds | |
| Unit-VI: | 10 hours |
| The Dynamics of ecosystem: The components, abiotic substances, producers, consumers, decomposers, transformers, productions rates, energy flow structure and ecological pyramids. | |
| Unit-VII: | 04 hours |
| Aquatic pollution monitoring and control. | |
| Unit-VIII: | 04 hours |
| Benthic communities and Detritus: Organic carbon cycling and Ecosystem metabolism. | |
| Unit-IX: | 04 hours |
| Lowland rivers, flood plains and wetlands | |
| Unit-X: | 04 hours |
| Conservation and management of aquatic ecosystem | |

References:

1. Tonapi, G.T. (1980): Freshwater animals of India. Oxford and IBH Publishing Company, New Delhi, India.
2. Blakey, D.R. and Hrusa, D.C. (1989): Inland Aquaculture development handbook. Fishing News Books Great Britain.
3. Jhingran, V.G. (1985): Fish and Fisheries of Indian Hindustan Publishing Co, New Delhi.
4. Pillay, T.V.R. (1990): Aquaculture Principles and Practices, Fishing News Books, Oxford

Paper: HCT-2.1- (I) BIOLOGY OF CHORDATES

64 hrs

| | | |
|-----------------|---|------|
| Unit-I | Origin and systematic position | (12) |
| | Origin of chordate in the light of recent theories, Protochordata: Life cycles of Salpa, Doliolium and Amphioxus, Significance of retrogressive metamorphosis | |
| Unit-II | Origin and evolution | (12) |
| | Agnatha, Placoderms and Chondrichthyes, Systemic position of Holocephali Osteichthyes: Lateral line system, Migration in fishes | |
| Unit III | Amphibia | (10) |
| | Origin and evolution, Breeding behaviour and parental care of living Amphibia, Neoteny Adaptive radiation | |
| Unit IV | Reptilia | (10) |
| | Origin and Evolution of temporal acrades and fossae, Extinct reptiles, Adaptive radiation in living reptiles, Poisonous and non-poisonous snakes in India. | |
| Unit V | Aves | (10) |
| | Aerial adaptations and mechanism of flight, Courtship and breeding behaviour, migration. Birds and human welfare, Aquatic Birds. | |
| Unit VI | Mammalia | (10) |
| | Origin and evolution of mammals. Adaptive radiation in Marsupials. Aquatic mammals. Origin and evolution of mammalian ear ossicles. | |

References:

1. Marshall, A.J and Williams. W.D (Ed). Textbook of Zoology: Vertebrates-VII Ed. Vol. II. AITBS Publishers and distributors, 1995.
2. Young, J.Z. The Life of Vertebrates, III rd Ed Clarendon Press Oxford,1981.
3. William N McFarland, F and Harvey Pough Tom.J.C and Heiser, J.B. Vertebrate Life. Collier-Macmillan Publishers, London, 1979.
4. Romer, W.B. The Vertebrate Body. Saunders, Philadelphia, 1956.

PAPER: HCT-2.2- DEVELOPMENTAL BIOLOGY

64hrs

Unit-I

(4)

Introduction: Overview of animal development. The questions of Developmental Biology. Anatomical approach to Developmental Biology. Experimental approach to Developmental biology.

Unit-II

(12)

Genes and Development: Embryological origin of gene theory. Evidence for genomic equivalence. Nucleo-cytoplasmic interactions in *Acetabularia* and in frog during early development. Nuclear-transplantation experiments in frog. Cloning in mammals and the Stem cell research and regenerative medicine.

Unit-III

(12)

Early embryonic development: Fertilization- structure of gametes, cellular and biochemical processes during early fertilization. Strategies for monospermy and conservation of species specificity. Acrosome reaction and egg activation. Cleavage and blastulation in *Drosophila*, *Amphoxius*, frog, chick and mouse (till blastocyst).

Gastrulation in frog, chick. Presumptive areas and fate maps.

Unit-IV

(12)

- a. Early development in *Drosophila*: Larva. Origin of anterior & posterior polarity, maternal effects of genes. Segmental genes, homeotic selector genes. Generation of dorso-ventral polarity.
- b. Early development in sea urchin egg: Experimental analysis of early development, biochemical and physiological gradients.

Unit-V

(12)

- a. Axis formation in Amphibians: The progressive determination of amphibian axis, primary embryonic induction. Function of organizer-Diffusible proteins of organizer. Regional specificity of induction.
- b. Organogenesis: Development of somites and differential cell proliferation in shaping organ primordia. Differentiation of neural tube - anterior posterior axis, dorsoventral axis, Differentiation of vertebrate lens.

Unit-VI

(12)

Post-embryonic and abnormal development: Regeneration in animals with reference to Hydra, Planeria and Salamander limb. Metamorphosis in Amphibia- morphological, biochemical changes and hormonal control of metamorphosis. Teratology-causation of abnormal development, experimental studies and teratogens. Ageing-consequences and causes of ageing. Control of ageing by genes.

References:

1. Gilbert, S.F. Developmental Biology IV ED. Sinauer Associates Inc. Publishers, Massachusetts, 2000.
2. Kalthoff. K. Analysis of Biological Development. McGraw Hill Inc. New York, 1996.
3. Rao, K. V. Developmental Biology: A Modern Synthesis. Oxford & IBH Publishing co. Pvt. Ltd, 1993.
4. Subramanian, T. Developmental Biology, Narosa Publishing House, 2002.
5. Twyman, R .M. Instant Notes. Developmental Biology. Bios Scientific Publishers Ltd, 2001.
6. Wolpert, L., Beddington, R., Brocks, J., Jessel, T., Lawrence, P and Meyerwitz, E. Principles of Development. Oxford Univesity Press, 1998.

Paper : HCT-2.3 (I) - MOLECULAR GENETICS**64 hrs**

- Unit-I** (4)
History and scope of molecular genetics. Identification of DNA as genetic material. Properties, storage and transmission of genetic information.
- Unit-II** (8)
DNA Replication: Semi conservation of double stranded DNA. DNA polymerases and ligases. Events in replication fork. Discontinuous replication. Leading strand. Circular DNA and its replication.
- Unit-III** (9)
Transcription: Prokaryotic transcription. RNA polymerases. Transcription signals. Classes of RNA molecules-messenger, soluble, ribosomal and transfer. Transcription in Eukaryotes. Means of studying intracellular RNA- 5-cap formation, 5-end processing, polyadenylation, splicing, editing and nuclear export.
- Unit-IV** (10)
Translation: The genetic code. Transfer RNA and aminoacyl synthetases. Initiation. Elongation and transfer factors. The Wobble hypothesis. Polycistronic mRNA. Overlapping genes. Ribosomes.
- Unit-V** (8)
Regulation of gene activity: Principles of regulation. *E. coli* lactose system and Operon model. Tryptophane Operon. Auto regulation and feedback initiation.
- Unit-VI** (7)
Mutation: Types of mutations. Biochemical bases of mutations. Mutagenesis-base analogue mutation, ultraviolet irradiation, mutagenesis, intercalating substances and transposable elements.
- Unit-VII** (8)
Bacteriophages: Stages in the lytic cycles of typical phage. Specific phages. *E. coli* Phage T₄, *E. coli* Phage T₇, *E. coli* Phage θ XT₄, *E. coli* Phage λ . Lytic cycle. The transgenic life cycle.
- Unit-VIII** (10)
DNA recombination and repair: Alteration of DNA molecules. Repair of incorrect bases. Repair of thymine dimers. Recombination repair. Isolation. Characterization and joining of DNA molecules. Genetic transposition.

References:

1. Atherly.A.G., Girten,J.R and Mcdonald, J.F. The Science of Genetics. Saunders college, 1999.
2. Gardner, E.J., Simmons, M.J and Snustad, D.P. Genetics IIIEd. John Willy & Sons, New York, 1990.
3. Stickberger, N.W. Genetics. MacMillan Publishing Co. New York, 1985.
4. Watson, J.D et al., Recombinant DNA. W.H.Freeman & Co, 1992.
5. Trevor,B.B and Julian Burke. Gene structure and transcription. Oxford Univ Press, 1998.
6. Benjamin Lewin. Genes Vols I-IV. Oxford Univ Press, 1995.

Paper: SCT-2.3 (II) - Wildlife Biology and Conservation

64Hrs

Unit-I **(6)**

- i) Introduction to study of wildlife; Definition; Historical accounts.
- ii) Importance of wildlife; Ecological, Scientific, Ethical, Aesthetic, Game and Commercial values of wildlife.
- iii) Forest and wildlife as natural resources.

Unit-II **(6)**

- i). Biogeographic regions of India; Distribution of wildlife: Global scenario, Indian scenario- Himalayan ranges, Western Ghats, Andaman and Nicobar Islands.
- ii). Wildlife habitats and their protection.

Unit-III **(6)**

Biology of Indian wildlife:
An introduction to mammals, birds, reptiles and amphibians, fishes, insects and other invertebrates of the wild-their zoogeography, adaptations, special aspects in brief.

Unit-IV **(6)**

Wildlife study :(a) Traditional methods-Capturing, Marking, Tagging (b) Modern methods: Photography, Recording of calls, Use of Radio-location, Telemetry, Remote sensing.

Unit-V **(8)**

- i). Extinction of organisms; trends in extinction
- ii). Causes for depletion of wildlife with special reference to India.
Endangered fauna of India-Invertebrates and vertebrate

Unit-VI **(14)**

Wildlife conservation and management:

- i). General importance; History of wildlife management and current status; protected area network in India.
- ii). Special conservation projects in India-Project Tiger, Project Gir Lion, Project hangul, musk deer project, Manipur Deer project, Project Elephant, Crocodile Breeding Project, Great Indian Bustard project.
- iii). Zoos, wildlife sanctuaries, National parks, Biosphere reserves and their role in conservation of wildlife.

Unit-VII (10)

- i). Wildlife legislations-need and perspectives
- ii). Trade in wildlife; CITES
- iii). Wildlife (Protection) Act, 1972.
- iv). Wildlife (protection) Act, 1972-Schedules-Schedule I [part-I, II, II A, III, IV, IV A, IV B, IV C], Schedule-II, III, IV, V, & VI

Unit-VIII (6)

Wildlife crimes-Introduction; Pouching, Smuggling; Prevention of wildlife crimes-Agencies and their role.

Unit-IX (4)

- i). Organizations connected with wildlife management and conservations: WWF-India; BNHS; IBCN.
- ii). Awareness about wildlife - role of Government and Non-government organizations.

Reference Books:

1. Dasmann F Raymond. Wildlife Biology. Wiley eastern Ltd. India .1982
2. Burnie, D. (Ed). Animal : The Definitive Visual Guide to the World Wildlife. D.K Publications. 2001
3. Anderson, S Managing Wildlife Resources. Prentice-Hall ,Englwood Cliffs, New Jersey. 1991
4. Gee, E. P The Wildlife of India. E.P. Dutton Co. N.Y. 1964.
5. Nair , S.M. Endangered animal of India and their Conservation. National Book Trust ,India 1992.
6. Khoshoo, T.N Environmental Concerns and Strategy. Ashish publishing House, New Delhi. 1985.
7. Rao, R.R. Endangered species: Problems of assessment and conservation. Zoo Print, 12: 1-4. 1994.
8. Thapar, V. Land of Land of the Tiger : A natural history of the Subcontinent. BBC Books London. 1997.
9. The wildlife Protection Act (1972). Allahabad Law Publishers (India) Pvt. Ltd 1995.
10. Prater, S.H The Book of Indian Animals. BNHS Mumbai . Oxford University Press. 1998.

Paper: OET-2.1 - HUMAN PHYSIOLOGY

64 Hours

- Unit-I.** (4)
Introduction to physiology: Cell and general physiology. Functional organization of human body. Internal environment and homeostasis. Cell and its function. Genetic control of protein synthesis.
- Unit-II** (10)
Membrane physiology: Molecular organization of membrane transport across membrane. Anatomy and physiology of skeletal and smooth muscles. Anatomy and physiology of cardiac muscles. Cardiac arrhythmias, ECG myocardial infarction and cardiac arrest.
- Unit-III** (8)
Blood circulation: Arteries, veins and capillaries. Blood flow and blood pressure. Regulation of blood circulation. Composition of blood, blood groups, blood transfusion and artificial blood.
- Unit-IV** (8)
Functional morphology of the gastrointestinal tract. Physiology of digestion and absorption. Nutrition and balanced diet and vitamins. Malnutrition, over-nutrition and obesity. Hyperacidity, amebeiosis, worms and gastroenteritis.
- Unit-V** (6)
Respiratory organs and physiology of respiration. Transport of gases. Energetics. High altitude and diving physiology. Regulation of respiration. Respiratory distress and asthma. Breathing exercises.
- Unit-VI** (4)
The kidneys: Physiology of excretion. Urine formation. Micturition and diuretics. Renal failure and dialysis.
- Unit-VII** (16)
- a) General organization of the nervous system: peripheral and central nervous system. Sensory and motor systems. Structure of neuron and conduction of nerve impulse. Functional differentiation of brain. Mind and memory. Deviated mental functions, mania, depression and schizophrenia
 - b) Sensory organs and their physiology: photoreceptors, auditory receptors, olfactory and gustatory receptors.

Unit-VIII

(8)

Hormones and their physiological actions. Physiology of reproduction. Spermatogenesis and oogenesis, Pregnancy and parturition. Infertility and assisted reproductive technologies. Prenatal identification of sex and gender bias.

References:

1. Text book of medical physiology: Guyton AC and Hall JE, Xth edition Saunders , Philadelphia, 2004.
2. Concise medical physiology: Chaudhuri SK, 4th edition, Central Book Agency, 2002, Kolkata.
3. Biological sciences: Taylor DJ, Green, NPO and Stout GW edited by Soper R, Cambridge University Press, 3rd edition 1997, Cambridge UK.
4. Animal physiology: Schmidt-Nielson K, 5th edition, Cambridge University Press, Cambridge UK.
5. Human physiology: Wiki books contributors.
http://en.wikibooks.org/wiki/Human_Physiology.
6. Human Physiology: An Integrated Approach with Interactive Physiology: Dee Unglaub Silverthorn DU, 3rd edition, Prentice Hall.

Paper : HCT-3.1- BIOLOGY OF REPRODUCTION

- Unit I:** (3)
Reproduction-An overview
- Unit II:** (4)
Sex differentiation and development of gonads and gonadal ducts. Genetic basis of sex determination. Differentiation of gonads and gonadal ducts. Biogenesis of gonadal hormones. Role of hormones in sex differentiation.
- Unit III:** (5)
Reproductive cycles (Testicular and ovarian) in non-mammalian Indian vertebrates.
- Unit IV:** (4)
Anatomy of male reproductive system: Histoarchitecture of the testis, Spermatogonia-stem cells, spermatogenesis, somniferous epithelial cycle- wave and cycle. Stem cell renewal. Hormonal control of spermatogenesis. Physiological role(s) of androgens.
- Unit V:** (6)
Functional morphology and hormonal regulation of male reproductive organs: Epididymus, Vas deferens, Prostate gland, Seminal vesicle, Coagulatory- gland, Cowper's gland. Biochemistry of semen and biology of spermatozoa.
- Unit VI:** (9)
Anatomy of female reproductive system: Histoarchitecture of ovary, Folliculogenesis, Follicular atresia. Mechanism of ovulation, Luteogenesis, Lutinization, Luteolysis and Lutealfunction. Physiological role of estrogens. Estrous cycle in mammals and its hormonal regulation. Menstrual cycle and its hormonal regulation.
- Unit VII:** (8)
Implantation- Types of implantation, sequence of events during implantation, decidual cell reaction, delayed implantation, cell adhesion molecules, growth factors, hormonal regulation. Placenta: Types, physiology, histophysiology, immunobiology. Endocrine functions of placenta. Placental hormones. Foetoplacental unit.

Pregnancy: Corpus luteum, luteotrophic complex in different animals, endocrine control of pregnancy in rat. Metabolic activity during pregnancy
- Unit VIII:** (6)
Parturition: Activation and stimulus of uterus. Parturition in animal models, factors involved in parturition- prostaglandin, oxytocin. corticosteroids and other factors. Lactation: Morphological and functional development of mammary glands. Effects of hormones. Milk ejection
- Unit IX :** (5)

Reproductive technologies: In vitro fertilization. Gamete intrafallopian transfer. Surrogate pregnancy, gestational carrier. Fertility control in male and female.

Reference Books:

1. Bentely, P.J. *Comparative Vertebrate Endocrinology-UI* Ed, Cambridge University Press, 1998.
2. Degroot, L.J. & Neill, J.D. (Eds). *Endocrinology Vol I-III* W.B. Saunders Co, 2001.
3. Hadley. Mac. E. *Endocrinology*. Prentice Hall International Inc, 1992.
4. Knobil, E and Neill, J.D. (Eds). *Encyclopedia of Reproduction*. Vol. I-IV. Academic Press, 1998.
5. Knobil, E and Neill, J.D. (Eds). *The Physiology of Reproduction II. Vol I and II*. Raven Press Ltd, 1994.
6. Mandal, A. *Handbook of Neuroendocrinology*. EMKAY Publications, 1994.
7. Nelson, R.J. *An Introduction to Behavioural Endocrinology*. Sinauer Associates Inc, 1995.
8. Turner, CD and Bagnara, J.T. *General and Comparative Endocrinology*, 1998.
9. Williams, RM. *Textbook of Endocrinology*. W.B. Saunders.
10. Martin, C.R *Endocrine Physiology*. Oxford University Press.
11. Saidapur.S.K. (Ed). *Reproductive Cycles of Indian Vertebrates*. Allied Publishers Ltd. New Delhi, 1989.

Paper : HCT-3.2- ANIMAL PHYSIOLOGY**64 Hours****Unit I****(5)**

Transport of gases:

A) Respiration: The atmosphere, solubility of gases, respiration in waer, respiratory organs, mammalian lungs, air breathing fish, bird respiration, respiration in eggs, insect respiration.

(5)

B) Blood: Oxygen transport in blood, Oxygen dissociation curvs, facilitated diffusion, carbon dioxide transport in blood, Acid base balance regulation.

(5)

C) Circulation: General Principles, vertebrate circulation, the physics involved in tubes, invertebrate circulation, Homeostasis.

Unit II

Food and Energy:

A) Feeding, digestion, nutrition, specific nutritional needs, chemical defense. **(5)**

B) Energy Metabolism: Metabolic rate, energy storage (fat and glycogen), effect of oxygen concertation, problems if diuving, metabolic rate and body size, size and problems of scaling, energy cost of locomotion, physiological time and effect of high altitude. **(5)**

Unit III**(6)**

Temperature:

A) Temperature effects: effects of temperature change, extreme temperatures-limits to life, tolerance to high temperature, tolerance to cold and freezing temperature adaptation.

B) Temperature regulation: Body temperature of birds and mammals heat transfer, heat balance, torpor and hibernation, Body temperature in 'cold blooded' animals.

Unit IV**(8)**

Water:

Water and osmotic regulation; The aquatic environment, aquatic invertebrates and vertebrates, terrestrial environment, moist skinned animals, arthropods terrestrial vertebrates, marine air-breathing vertebrates. Hormones and osmoregulation

Excretion: Nitrogen excretion-Patterns.

Unit V**(10)**

Enzyme catalysis:

Enzymes as catalysts, enzyme kinetics, regulation of enzyme activity, active sites, coenzymes, activators, inhibitors, isoenzymes, allosteric enzymes, ribrozymes.

Unit VI**(10)**

Movement: Muscle and movement, skeletons, Locomotion: biomechanics, buoyancy, Control and Integration: Neuronal circuits, neurotransmitters, transmission of nerves impulses in nerves and across synapses (excitation, inhibition and computation). Information and Senses: General principles, chemical senses, vibration, pressure and sound, Light and vision, transmission and sorting of sensory information.

Books :

1. Neilsen, K.S. Animal Physiology: Adaptation & Environment. IV Ed. Cambridge University Press, 1995.
2. Prakash, M & Arora, C.K. Encyclopedia of Animal Physiology. Anmol Publications, New Delhi, 1998.
3. Pestonjee, D.M. Stress and Coping. Sage Publications, London, 1999.
4. Poole, M.C., Pilkey Grant and Johnson.E.C. Biology in Action. Harcourt Brace, Canada, 1995.
5. Hoar, W.S. General and Comparative Animal Physiology. Prentice Hall Inc, New Delhi, 1983.
6. Guyton C. Arthur and Hall J.E. Textbook of Medical Physiology. W.B.Saunders C. London, 1996.
7. Randall David., Burggren. W and French, K. Animal Physiology. W.H. Freeman and Co. New York, 1997.

Paper : SCT-3.1- (I)Environmental Biology

64 Hrs

Unit -I

(02)

Our Environment: Atmosphere, Hydrosphere, Lithosphere; Biogeographical realms.

Unit -II

(10)

a) Development and evolution of ecosystem; Components of ecosystem; Types of ecosystem including habitats.

b) Energy flow in ecosystem: Food chain, food web; Trophic structure and energy pyramids; ecological energetics.

c) Hydrologic cycle ; Biogeochemical cycles (N,C,P cycles).

Unit -III

(15)

Natural resources; Renewable and Non –renewable resources.

a) Forest resources; use and overexploitation; deforestation; conservation and sustainable management.

b) Water resource; use and overutilization of surface and ground water; Floods; Drought; Conflicts over water usage; Dams -benefits and problems; conservation and sustainable management.

c) Food resources: World food scenario; Effects of modrn agriculture ; Fertilizer –pesticide problems

d) Land resource:Land classification and use ; Land degradation induced landslides, soil erosion, desertification.

e) Mineral resources (Metallic and Non metallic): Distribution, utilization, conservation and management.

e) Energy resources: Conventional and non-conventional resources; Growing energy needs and sustainable management.

Unit – IV

(14)

a) Environmental pollution: definition, causes, effects and control measures of:-

i)Air Pollution, ii)Water Pollution,iii)Soil pollution, iv)Noise pollution)Thermal Pollution
vi) Nuclear hazards

b) Solid waste management; Causes, Effects and control measures.

c) Biomedical waste management: Causes, effects and control measure

Unit – V (08)

- a) Toxic Pollutants and their impact on non-target flora, fauna and humans.
- b) Biodegradation, biotransformation, biomagnification and bioaccumulation of toxicants.
- c) Monitoring environmental pollutants : Physical and chemical methods ; Biological indicators and monitoring.

Unit – VI (04)

- a) Disaster management: Floods, Earthquake, Cyclone and Landslides.
- b) Climate change – global warming, Ozone layer depletion, acid rain

Unit – VII (03)

- a) Human ecology: values and ethics of human environment; Population growth and related issues;
- b) Environment and human health; Human rights.

Unit – VIII (08)

- a) Environment and Social issues:
 - i) Resettlement and rehabilitation of people
 - ii) Wasteland reclamation
 - iii) Environmental ethics.
- b) Environmental awareness ; environmental education - role of educational institutes and Other agencies.
- c) Environmental Protection Act and related Acts.

Reference Books:

1. Willmer, P., Stone.G and Johnston, I. Environmental Physiology of animals. Blackwell Science Ltd.
2. Mckinney, M.L and Schoch, R.M. Environmental Science: Systems and Solutions. Jones & Bartlett Publishers, 1998.
3. Cunningham, W.P. Environmental Science-V Ed. WCB McGraw Hill, 1999.
4. Clesceri, L.S., Greenberg, A.E and Eaton.A.D. Standard Methods for the Examination of Water & Waste Water-XX Ed. American Public Health Association, 1998.
5. Arora, R.K. Air Pollution. Causes & Effective control. Mangal Deep Publications, Jaipur, 1999.
6. Chakraborti, N.K. Environmental Protection and Law. 1994.
7. Chitkara, M.G. Encyclopedia of Ecology, Environment and Pollution. Vol. I-XIII, 1997.
8. Chapman, J.L and Reiss, M.J. Ecology: Principles and Applications. Cambridge University Press, 1999.
9. Eldon, D Enger and Bradly F. Smith. Environmental Sciences, 1995.

Paper : SCT-3.1- (II) EVOLUTIONARY BIOLOGY

64 Hours

Unit I

(4)

Introduction: An overview of landmarks in Evolutionary Biology

Unit II

(10)

Concept of organic evolution: Origin of life. Evolution through ages - Geological time scales. Evidences of organic evolution. Evolution of man through ages.

Unit III

(8)

Darwinism: Contributions of Charles Darwin, Alfred Russell Wallace and Thomas Malthus. Postulates of Darwinism - objectives and evidences. Recent developments on Lamarkian concepts.

Unit IV

(8)

Speciation: Biological and phylogenetic concepts of species. Pattern and mechanisms of reproductive isolation. Models of speciation - Allopatric, Sympatric and Strasipatric.

Unit V

(4)

Origin of higher categories: Phyletic gradualism and punctuated equilibrium. Major trends in the origin of higher categories. Micro and macro evolution.

Unit VI

(10)

The evolution of life histories: Basic questions in the evolution of life history. Evolutionary age and size at maturation. Life history trade offs - optimality arguments and trade off surfaces. Empirical evidences of life history trade offs. Evolution of clutch size and reproductive investment. Evolutionary life span and ageing.

Unit VII

(6)

Evolution of sex: The problem with sex. Sex and recombination. Hypothesis and advantage of sex and recombination. Sex ratio, sex allocation and sex determination. Evolution of inbreeding and out breeding.

Unit VIII

(2)

Impact of evolutionary biology on medicine.

Reference Books:

1. Futuyama, D.J. Evolutionary Biology- III Ed. Sinauer Associates Inc. Massachusetts, 1998.
2. Gerhart, J and Kirchner, M. Cell, Embryos & Evolution. Blackwell Science Publishers, 1997.

3. Keynes, R. Charles Darwin's Zoology Notes & Specimen List from H.M.S Beagle. Cambridge University Press, 2000.
4. Price, P.W. Biological Evolution. Saunders College Publishing, 1995.
5. Smith, J.M. Evolutionary Genetics. Oxford University Press, 19

Paper : OET-3.1- APPLIED ZOOLOGY**64 Hours****Unit 1 (8)**

Sericulture: Modern rearing methods for chawki and lateage silkworm, procurement and incubation of eggs, synchronization of hatching, brushing and feeding leaf quality and its preservation. Rearing from brushing to mounting for seed production and silk production.

Unit II (7)

Apiculture: Importance, history and development of bee keeping. Different species of honeybees and their distribution. Management of bees, product and by product of apiculture and their use.

Unit III (7)

Vermiculture: Introduction and importance of vermiculture, Uses of earthworms for biodegradation of organic waste materials, Earthworms as protein source, Vermiculture technique.

Unit IV Aquaculture: 10 hr

- a) Fin-fish Culture: Freshwater, brackish-water and marine fish culture in India.
- b) Shell-fish Culture: Prawn edible bivalve and Pearl culture.

Unit-V Dairy: History, Importance and scope of Dairy 12 hr

- a) Dairy breeds and Management : Cattle breeds: Milk breeds, Draught breeds, Exotic breeds Buffalo breeds: Swamp buffaloes and Riverine Buffaloes
- b) Principles and methods of breeding: Inbreeding, out breeding and cross breeding. Fertility and breeding efficiency, artificial insemination
- c) Dairy products: Physico-chemical properties of cow and buffalo milk, Processing, preservation and marketing of milk and milk products.
- d) Dairy pathology: Viral, Bacterial, parasites (Endo-Ecto) and vaccination programs

Unit-VI Poultry: History and Importance and Scope of poultry. 10 hr

- a) Poultry Breeds
- b) Principles and techniques and methods of breeding
- c) **Poultry products:** Egg, Meat, feather, excreta, nutritive value of egg and meat.

d) Poultry pathology: Viral, Bacterial, fungal and protozoan diseases and their control, vaccines and for infections.

Unit-VII Lac culture: Lac insect (Scientific name), composition of Lac, strains of Lac insect, cultivation of Lac host plants (in brief) processing of Lac and uses of Lac**5 hr**

Unit-VIII Fur Animal farming - Rabbit meat production. Disposal and utilization of fur and wool and recycling of waste by products. Grading of wool. **5 hr**

Paper: HCT-4.1- BIODIVERSITY

64 Hours

Unit – I:**(05)**

- a) Biodiversity: Concepts, Definition.
- b) Values of biodiversity: Consumptive use and Productive use ; Social, Ethical, Aesthetic, Option & Environment service values.

Unit – II :**(15)**

- a) Genetic diversity: Nature and origin of genetic variations; Measurement of genetic diversity.
- b) Species diversity: History and origin of species diversity; Species diversity indices ; Measures of diversity – Alpha, Beta & Gamma diversity.
- c) Ecosystem diversity: Classification and nature of ecosystems (in brief); Ecosystem diversity of India (in brief)
- d) Agro- biodiversity: Origin and evolution of cultivated species diversity ; Vavilovian centers ; Diversity in domesticated animal species.

Unit – III :**(10)**

- a) Biodiversity at global, national and local levels.
- b) Hot spots of biodiversity; India as a megadiversity nation.
- c) Endemism and endemic species.

Unit – IV:**(10)**

- a) Threats to biodiversity: Deforestation & habitat destruction, Hunting & Overexploitation; Introduction of exotic species, Pollution.
- b) Endangered, Vulnerable, Rare and Threatened species.
- c) Conservation of Biodiversity: Objectives and action plans; Strategies – In-situ and Ex- situ conservation; Peoples movement, Role of educational Institutions and NGO's, Biodiversity Awareness programmes

Unit – V : (08)

- a) Biodiversity legislation: Legal aspects with special reference to India; CITES; Trade-related Intellectual Property Rights.
- b) Biodiversity conventions: Earth Summit and other conventions; Convention on Biological Diversity.

Unit – VI: (08)

Biodiversity and Biotechnology: Role of Biotechnology in

- a) Assessment of biodiversity and bioresources ;
- b) Biodiversity conservation ;
- c) Utilization of Biodiversity / Bioresources. GMO's and their impact on biodiversity .

Unit – VII: (08)

- a) Biodiversity Management: Organizations associated with biodiversity management – IUCN, UNEP, UNESCO, WWF, FAD, WCMC –their role and contributions.
- b) Bioprospecting ; Biopiracy ; Biosafety.
- c) Future strategies for Biodiversity Conservation in India.

Books:

1. Dasmann. F Raymond. Wildlife Biology. Wiley Eastern Ltd. India. 1982.
2. Encyclopedia of Nature and Science. Vols 1-18. Bay Books Pvt.Ltd. Sydney, 1974.
3. Burnie. D. (Ed). Animal: the Definitive Visual Guide to the Worlds Wildlife. D.K.Publications, 2001.

Paper: HCT-4.2- ANIMAL BEHAVIOUR

- Unit I** (3)
Introduction: The science of animal behaviour-brief history. Diversity and unity in the study of behaviour and complex behaviour.
- Unit II** (6)
Development of behaviour: Accommodative and Associate learning. Hormones and early development. Genetic basis of behaviour. Neural control of behaviour.
- Unit III** (5)
Stereotyped behaviour: Kinesis, taxis, orientation and reflexes.
- Unit-IV** (9)
Motivation and conflict behaviour: decision making on different scales, drive, models of motivation, stress, territorial conflicts, threat display, displacement activities and fighting as conflict behaviour.
- Unit-V** (6)
Stimuli and communication: Diverse sensory capacities, sign stimuli, stimulus filtering. Communication.
- Unit-VI** (7)
Ecological aspects of behaviour: Habitat selection, food selection, optimal foraging theory, anti-predator defenses. Aggression, homing, territoriality, dispersal. Host-parasite relations.
- Unit-VII** (5)
Courtship and ritual behaviour: Mate selection, male-male selection, female choice and maternal behaviour.
- Unit-VIII** (3)
Social organizations in insects and primates.
- Unit-IX** (5)
Biological rhythms: Circadian and circannual rhythms.
- Unit 1X** (8)
Hormones and behaviour: Pheromones and their biological actions in vertebrates and invertebrates. Chemical communication, body coloration, social life in insects (Termites and honey bees). Hormone in insect & crustacean metamorphosis.

Books:

1. Aubrey Manning and Marian. S. Dawkins. *An Introduction to Animal Behaviour*. Cambridge University Press, 1995.
2. McFarland. D. *The Oxford Companion to Animal Behaviour*.
3. McFarland.D. *Animal Behaviour Psychology, Ethology and Evolution*. Pitman Publications, 1985.
4. Slater.P.J.B. *Essentials of Animal Behaviour*. Cambridge University Press, 1999.
5. Krebs J.R and Davies, N.B. *An Introduction to behavioural Ecology-III* (Ed). Blackwell Science Ltd, 1993.

Paper: SCT-4.1 (I) - ENDOCRINOLOGY**Unit I**

(6)

Evolution of endocrine function. Hormones as biological signals. Classification of hormones. Parallelism in endocrine and nervous functions. The concept of neuroendocrine system. Methods in endocrine research.

Unit II

(6)

Nature of hormone action: Hormone receptors- Membrane, cytosolic and nuclear receptors. Mechanism of signal transduction - role of G-proteins. Cyclic AMP and the second messenger concept. Prostaglandins and Calmodulin in hormone action.

Unit III

(6)

Structure of hypothalamohypophysial complex in vertebrates. Hypothalamic regulation of pituitary function-comparative account. The hormonal feedback systems. The caudal neurosecretory system in fish.

Unit IV

(6)

The pineal gland: Comparative morphology in vertebrates. Biosynthesis and metabolism of melatonin. Pineal function in different vertebrates. The frontal and parietal organs. Pineal and biological rhythms. Evolution of melatonin.

Unit V

(6)

The pituitary gland; Comparative morphology, chemistry and biological actions of anterior and posterior pituitary hormones.

Unit VI

(6)

Thyroid and parathyroid glands: Evolution of thyroid function in vertebrates. Biosynthesis and biological actions of thyroid hormones. Parathyroid hormones and calcium homeostasis: parathormone, calcitonin, vitamin D and their interaction.

Unit VII

(6)

Adrenal glands: Comparative morphology. Biosynthesis and biological actions of corticosteroid hormones. The adrenal catecholamines their biosynthesis, physiological actions and metabolism. Cortico-medullary interrelation in vertebrates. The Corpuscles of Stanius in fish.

Unit VIII

(4)

Hormones of the GI tract and pancreas, chemistry and physiological actions of GI hormones, insulin and glucagons. Glucose homeostasis.

Unit IX

(4)

Hormones in growth and development: Nerve growth factor (NGF), epidermal growth factor (EGF). Hormones and metabolism: Regulation of carbohydrate, lipid and protein metabolism.

Books:

1. Bentley, P.J. Comparative Vertebrate Endocrinology-III Ed. Cambridge University Press, 1998.
2. Degroot, L.J. & Neill, J.D. (Eds). Endocrinology Vol. I-III. W.B. Saunders Co, 2001.
3. Hadley. Mac.E. Endocrinology. Prentice Hall International Inc, 1992.
4. Knobil, E and Neill, J.D. (Eds). Encyclopedia of Reproduction. Vol I-IV. Academic Press, 1998.
5. Knobil, E and Neill, J.D. (Eds). The Physiology of Reproduction II. Vol. I and II. Raven Press Ltd, 1994.
6. Mandal, A. Handbook of Neuroendocrinology. EMKAY Publications, 1994.
7. Nelson, R.J. An introduction to Behavioural Endocrinology. Sinauer Associates Inc, 1995.
8. Turner, C.D and Bagnara, J.T. General and Comparative Endocrinology, 1998.
9. Williams, R.H. Textbook of Endocrinology. W.B. Saunders.
10. Martin.C.R. Endocrine Physiology. Oxford University Press.

Paper: SCT-4.1 (II) PARASITOLOGY**64 Hours**

- Unit-I** (4)
Origin and evolution of parasitism. Kinds of hosts and parasites.
- Unit-II** (10)
Pathogenic microorganisms: Brief outline classification of microorganisms. Bacterial cell structure. Food and water-borne bacterial diseases. Sexually transmitted bacterial diseases. Skin and wound bacterial diseases.
- Unit-III** (10)
Pathogenic Protozoa: Amoebiasis and differentiation of different amoebae. Giardiasis. Trypanosomiasis of man and domestic animals. Haemosporidians of man and domestic animals. Coccidiosis of poultry. Myxosporians of fishes. *Nossema* and other pathogenic protozoa of insects.
- Unit-VI** (4)
Pathogenic Nematodes: etiology, epidemiology, pathogenesis, diagnosis, prevention and control of diseases due to *Wuchereria sp*, *Trichinella spiralis* and Hookworms.
- Unit V** (4)
Pathogenic trematodes: Etiology, epidemiology pathogenesis, diagnosis, prevention and control of diseases due to *Fasciola hepatica*, *Fasciolopsis buski* and *Systosoma sp*.
- Unit-VI** (4)
Pathogenic Cestodes: Etiology, epidemiology pathogenesis, diagnosis, prevention and control of diseases due to *Echinococcus*, *Hymenolepis* and *Diphylobothrium*.
- Unit -VII** (10)
Arthropods as parasites and vectors: Kinds of vectors.
Blood sucking dipterans: Biology of mosquito. Role of blood sucking dipterans in transmission of diseases.
Soft and hard ticks: Biology of ticks. Role of ticks in transmission of diseases.
Crustacean parasites of fishes
- Unit-VIII** (4)
Effects of parasitism on host. Effects of parasitism on parasites.

Reference Books:

1. Hoare C. A (1950) Handbook of Medical Protozoology, London: Baltimore, Tindall & Cox.
2. Levine. N.D. (1973) Protozoan Parasites of Domestic Animals and of Man. 2nd Ed. Minncapolis: Burgess.
3. Levine.N.D (1978) Textbook of Veterinary Parasitology. Minneapolis: Burgess.
4. Noble.E.R. And Noble. G.A. (1961) Parasitology. The Biology OF Animal Parasites. London: Kimpton.
5. Richards, W. and Devis, R.G. (1971) Imm's General Texbook OF Entomology. 10TH Ed. London: Chapman & Hall.
6. Smith.K.G.V. (1973) Insects and other Arthropods of Medical Importance. London: British Museum of Natural History.
7. Smyth, J.D. (1976) Introduction to Animal Parasitology. London: Hodder and Stoughton.
8. Soulsby, E.J.L (1965) Textbook of veterinary Clinical Parasitology. Vol. I Helminths. Oxford:Blcakwell Scientific.
9. Soulsby, E.J.L. (1966) Biology of Parasites. New York: Academic Press.

