



RAICHUR UNIVERSITY, RAICHUR

Regulations and Syllabus

for

P.G.DEPARTMENT OF STUDIES IN ZOOLOGY

(I Semesters)

(Under Choice Based Credit System)

w.e.f.

(2023-24 onwards)

- 1 . The CBCS syllabus for the M.Sc. Zoology course was drafted after several deliberations and discussions and placed in the Meeting of the Board of Studies in Zoology for approval and implementation from the academic year 2023- 24 and onwards (copy enclosed).
2. The course structure: The student desirous for M.Sc. Degree in Zoology, shall complete the required credits as mentioned in the course structure. The Department also offers OET paper in II and III Semester with 2 credits for each paper for students of other subjects. The details of HCT, SCT, OET and HCP, SCP courses of I, II, III and IV Semester, Credits, Teaching hours, Exam hours, Internal and Semester end examinations marks and Total marks are given in the course structure table.
3. Each candidate shall undertake compulsory "Study Tour" or "Field Visit" so as to study animal biodiversity in nature or visit to different Museum, Animal Houses, National Parks, Wild Life Sanctuaries, Biosphere Reserves and other important institutions working on Animal Research. The duration of the tour shall be maximum of up to 5days. The study tour shall be undertaken compulsory during III (Third) Semester of M.Sc. Course. Candidates have to submit the detailed tour report at the time of SCP: 3. 1a or SCP: 3.1b, which carries 5 marks.



M.Sca Zoology Course Structure

(Semester, Course Code, Course title, Credits, Teaching, practical Hrs. Examination Hrs. and Marks)

Semester	Course Code & Title	No. of Credit Points	Teaching Hrs [Week	Exam. Hrs.	Internal Assessment Marks	Semester End Examination Marks	Total Marks
	I-ICT 1.1 :Biosystematics	04	04	03	20	80	100
	HCT 1.2: Biology of Non-chordates and Chordates	04	04	03	20	80	100
	HCT 1.3: Evolutionary Biology	04	04	03	20	80	100
	SCT 1 .1a: Applied Zoology OR SCT 1 .1b: Computer applications and Bioinformatics	04	04	03	20	80	100
	. 1: Practical based on HCT 1.1	02	04	03	10	40	50
	HCP I .2: Practical based on HCT 1.2	02	04	03	10	40	50
	HCP 1.3: Practical based on HCT 1.3	02	04	03	10	40	50
	SCP 1 .1a: Practical based on SCT 1.1a OR SCP 1 .1b: Practical based on SCT 1.1b	02	04	03	10	40	50
	I-ICT 2.1: Genetics and Biostatistics	04	04	03	20	80	100
	HCT 2.2: Molecular Cell Biology	04	04	03	20	80	100
	HCT 2.3: Parasitology	04	04	03	20	80	100
	SCT 2.1a: Immunology OR SCT 2.1b: Biochemistry		04	03	20	80	100
	OET 2.1a: Economic Zoology OR OET 2.1b: Animal Behaviour	02	02	02	10	40	50
	HCP 2.1: Practical based on HCT 2.1	02	04	03	10	40	50
	HCP 2.2: Practical based on HCT 2.2	02	04	03	10	40	50
	HCP 2.3: Practical based on I-ICT 2.3	02	04	03	10	40	50
	SCP 2.1a: Practical based on SCT 2.1a OR SCP 2.1b: Practical based on SCT 2.1b	02	04	03	10	40	50
	HCT 3.1: Developmental Biology	04	04	03	20	80	100
	I-ICT 3.2: Animal Physiology	04	04	03	20	80	100
	HCT 3.3: Ethology	04	04	03	20	80	100
	SCT 3.1a: Wild life Biology and Conservation OR SCT 3.1b: Entomolo		04	03	20	80	100
	OET 3.1a: Reproduction and Development OR OET 3.1b: Diversi of Animals	02	02	02	10	40	50
	HCP 3.1: Practical based on HCT 3.1	02	04	03	10	40	50
	HCP 3.2: Practical based on HCT 3.2	02	04	03	10	40	50
	HCP 3.3: Practical based on HCT 3.3	02	04	03	10	40	50
	SCP 3.1a: Practical based on SCT 3.1a OR SCP 3.1b: Practical based on SCT 3.1b	02	04	03	10	40	50
	HCT 4.1: Endocrinology and Reproductive Biology	04	04	03	20	80	100
	HCT 4.2: Environmental Biology	04	04	03	20	80	100
	SCT 4.1a: Tools and Techniques in Biology OR SCT 4.1b: Histolo and Histochemist	04	04	03	20	80	100
	HCP 4.1: Practical based on HCT 4.1	02	04	03	10	40	50
	HCP 4.2: Practical based on HCT 4.2	02	04	03	10	40	50
	SCP 4.1a: Practical based on SCT 4.1a OR SCP 4.1b: Practical based on SCT 4.1b	02	04	03	10	40	50
	HCT 4.3: Project Work /Internshi	06	06	03	20	130	150
	Total Marks (I to IV Semester) 2500 Credits =106						

PRACTICAL COURSE IN

1999

4. Snedecor D.W. and Cochran W.G. 1967. Statistical Methods. Ed. VI. Oxford and IBH Publishing Co., New Delhi.
5. Robert R. Sokal & James F. Rohlf. 1994. Biometry- The Principles and Practice of Statistics in Biological Research. 3rd ed. W. H. Freeman & Company publishers.
6. Samuel, ML, 1991 Statistics for Life Sciences, Dellen Publishing Co, San Francisco.
7. Arthur M. Lesk, 2002. Introduction to Bioinformatics, Oxford University Press, New York
8. Satish Jain, O level made simple: Information Technology, BPB publications
9. Young, S. S. Computerized data acquisition & Analysis is for life Sciences: A Hands-on guide. Cambridge University Press, 2001.

SEMESTER I I

I-ICT-2.1: GENETICS AND BIOSTATISTICS

Total: 64 Hrs

Unit I: 16 Hrs Introduction:

Mendelian Genetics: Mendel's experiments; monohybrid crosses (dominance, recessiveness, codominance, semidominance, lethals); principle of independent assortment (dihybrid ratios, trihybrid ratios, gene interaction, epistasis); genetic vs environmental effects; multiple alleles (ABO blood type alleles in humans, Rh factor alleles in humans).

Sex determination and Sex linkage:

Mechanisms of sex determination (simple mechanisms, identification of sex chromosomes, sex determination in mammals and Drosophila, mosaics and gynandromorphs); environmental factors and sex determination; sex differentiation (sex chromatin bodies, dosage compensation); Sex influenced dominance; sex limited gene expression; sex linked inheritance (sex linkage in Drosophila, X-linked traits in humans)

Unit II: 16 Hrs Genetic materials, chromosomes, linkage, crossing over and chromosome mapping:

DNA structure (Watson and Crick model of DNA helix, conformational flexibility of DNA molecules); semiconservative replication of DNA; Chromosomes: chemical composition of eukaryotic chromosomes; giant chromosomes; packaging of DNA into chromosomes; euchromatin and heterochromatin.

Linkage; Crossing over; chromosome mapping; molecular mechanism of crossing over; gene conversion.

Unit III: 16 Hrs Recombination, transposable elements, gene expression, mutation, genetic fine structure and regulation of gene expression, genome organization:

Recombination: transformation, transduction, conjugation; Transposable elements: transposable elements in bacteria and eukaryotes, evolutionary significance; Gene expression: transcription,



translation, post transcriptional and post translational modifications; Mutation: spontaneous vs induced, types; Genetic fine structure: classical vs molecular concept of gene, fine structure and complex loci in eukaryotes; Regulation of gene expression: positive and negative regulations, regulation of gene expression in prokaryotes (lac operon and tryptophan operon), regulation of gene expression in eukaryotes; Genome organisation: salient features of yeast, Drosophila and human genome.

Unit IV: 16 Hrs Biostatistics

Introduction: types of biological data; populations; drawing samples from populations

Measures of central tendency: mean; median; mode.

Measures of dispersion: range; quantiles; mean deviation; variance; standard deviation.

Probability distribution patterns: normal, binomial, poisson distribution; Skewness and Kurtosis;

Parametric tests (student's t test; analysis of variance); non-parametric tests (Wilcoxon test, Mann Whitney U test, Kruskal Wallis test); Correlation and Regression; Chi square test.

HCP 2.1: GENETICS AND BIOSTATISTICS BASED ON

I-ICT-2a1

- 1) Study of Polytene Chromosomes in Chironomous Larva
- 2) Study of Polytene Chromosomes in Drosophila Larva
- 3) Study of Genetics of RBC Antigen
- 4) Study of X- Chromatin or Barr Body in Buccal Smear By Aceto Orcin
- 5) Human chromosome Analysis / Karyotype Analysis
 - a) Normal Male
 - b) Normal Female
- 6) Numerical abnormalities: a) Down's Syndrome, b) Monosomy 21
 - c) Klinefelter Syndrome d) Turners Syndrome
- 7) Structural Abnormalities :a) Translocation b) Cri- Du- Chat Syndrome
- 8) Study of Drosophila Mutants: a) Study of Normal Male and Normal Female
 - b) Study of Sepia Eye and White Eye c) Study of Ebony Body and Yellow Body
 - d) Study of Vestigial Wings and Curly Wing

A: BIOSTATISTICS

9. Preparation of frequency distribution tables.
10. Measures of central tendency: calculation of mean, median and mode for ungrouped and grouped series.
11. Measures of dispersion: calculation of standard deviation and standard error.
12. Graphical representation of biometric data: preparation of histogram, frequency polygon and frequency curve, cumulative frequency or ogive and scatter; line, bar and pie-diagram.
13. Tests of significance (problems for Student's 't' test, analysis of variance, z-test, Chi-square test)
14. Problem on Karl Pearson's Coefficient of correlation



PRACTICAL COURSE IN

15. Any other practical's depending on feasibility

Reference Books Recommended:

- 1 . Genes VIII Benjamin Lewin Prentice — Hall Publication
- 2 Principles of Genetics 6th Edition Snustard and Simon Willey Publication
- 3 Principles of Genetics Robert Tamarin
- 4 Molecular Biology of Cell. Alberts B. Johnson A. Lewis J. Raff M. Robert K & Walter P.
- 5 Molecular Cell Biology.Lodish. Berk. Kaiser. Krieger, Scott Bretscher, Ploegh, Matsudaira. 6th Edition. Freeman Publication
- 6 The Cell: A Molecular Approach 2nd Edition AMS Press Washington 2000
- 7 Biochemistry 7th Edition, Berg Jrn., Tymoczko JL., Strayer L.. W.H. Freeman Publication
- 8 Lahniger's Principles of Biochemistry 6th Edition. Michael M. Cox and David Nelson Macmillan Publishers.
- 9 Bailey, N.T.J. 2000. Statistical Methods in Biology. 3rd ed. Cambridge University Press. U.K. 10.Bailey, N.T.J., 1994. Statistical Methods in Biology-II Ed., Cambridge University Press. 11. Snedecor ,G.W and Cochran, W.C. Statistical Methods . Ed VI. Oxford and IBH Publishing co, New Delhi, 1967.

HCT 2.2: MOLECULAR CELL BIOLOGY

Unit I: 16 Hrs Introduction to the Cell: The origin and evolution of the cell, From Prokaryotes to Eukaryotes.

Membrane Structure and Function:

Structure of model membrane, The Lipid bilayer, Membrane proteins, Membrane carbohydrates, Membrane transport of micromolecules, Membrane transport of macromolecules. Electrical properties of membrane.

Cell Communication:

General principles of cell communication, Gap junctions, extracellular matrix, Collagen and Noncollagen component of the extracellular matrix, integrins.

Unit II: 16 Hrs Structural organization and functions of intracellular organelles:

The nucleus, Mitochondria, Lysosomes, Peroxisomes, Golgi apparatus, and endoplasmic reticulum.

The cytoskeleton:

Organization of the cytoskeleton, Intermediate filaments, Microtubules, Actin filaments, Cilia and Centrioles.

Molecular organization of the eukaryotic chromosome:

Chromosomal DNA, its packaging and organization, Polytene chromosomes, Lampbrush Chromosomes, Heterochromatin and Euchromatin, centromeres.

Unit III: 16 Hrs Protein Sorting:

Organelle biogenesis and protein secretion, synthesis and targeting of mitochondria, peroxisomal proteins, translational modification in the ER.

Intracellular traffic, vesicular traffic in the secretory pathway, protein sorting in the Golgi, traffic in the endocytic pathway, exocytosis.

Cell cycle:

Overview of the Cell cycle and its control, The molecular mechanisms for regulating mitotic events, Cell cycle control in mammalian cells, Checkpoints in cell cycle regulation.

Cell Signaling:

Overview of the extracellular signaling, Cell surface receptor, Signaling through G-protein coupled receptors, signal transduction pathways, second messengers, Interaction and regulation of signaling pathways.

Unit IV: 16 Hrs Programmed Cell Death:

PRACTICAL COURSE IN

a) Apoptosis v/s Necrosis b) Cell death pathway.

Aging:

a) Concept of aging-organismal b) Cellular changes during aging (DNA damages, shortened telomere, mitochondrial mutations, Oxidative stress) c) Theories of aging.

Cancer Biology:

Benign and Malignant tumors, Features of malignant cells, carcinogens and cancer development, Oncoviruses, Oncogenes, Tumor suppressor genes, Metastasis, Misregulation of growth regulatory pathways, loss of cell division and check point regulators, Treatment options.

I-ICP- 2.2:

MOLECULAR CELL BIOLOGY BASED ON

HCT-2a2

- 1) Study of Temporary Mounting of Tissue
 - a) Squamous Epithelial Tissue, Ciliated Epithelial Tissue and Columnar Epithelial Tissue
 - b) Myelinated and Nonmyelinated Nerve cells
 - c) Smooth Muscles, Striated Muscles and Cardiac Muscle
 - d) Bone and Cartilage
 - e) Blood Cells — Neutrophils, Basophils, Eosinophils, Lymphocytes and monocytes
- 2) Estimation of DNA by Discrete Diphenylamine (DPA) Method
- 3) Estimation of RNA by Orcinoi Method
- 4) Study of Mitosis by observing permanent slides
- 5) Study of stages of Mitosis in Onion Root Tips
- 6) Study of Meiosis by observing permanent slides
- 7) Study of stages of Meiosis in Grasshopper testis
- 8) Histopathological Examination (HPE) of Normal and Malignant cells.
- 9) Study of Barr body using buccal smear
- 10) Cell Death during development (Apoptosis). 1 1) Any other Practical depending upon feasibility

Reference Books Recommended:

1. Molecular Biology of Cell. Alberts B. Johnson A. Lewis J. Raff M. Robert K & Walter P.
2. Molecular Cell Biology. Lodish. Berk. Kaiser. Kringer, Scott Bretscher, Ploegh, Matsudaira. 6th Edition. Freeman Publication
3. The Cell: A Molecular Approach 2nd Edition AMS Press Washington 2000
4. De Robertis EDP & De Robertis EMI. Cell and Molecular Biology 7th Edition
5. Cell and Molecular Biology Gerald Karp
6. Abbas A.K. Lichtman A.H. & Pober J.S. Cellular and Molecular Immunology

Unit I:

16 Hrs

7. Alberts, B. , A. Jhonson, J. Lewis, M. Raff, K. Roberts and P. Walter 2008. Molecular
8. Biology of the cell. V Ed. Garland Science, New York.
9. Brachet, J. 1985. Molecular Cytology, Academic Press, N. Y.
10. Furukawa, R, and M. Fechheimer. 1997. The structure, function and assembly of actin filament bundles. Int. Rev. Cytol. 175: 29-90.
11. Lodish, H. , A. Berk, C.A Kaiser, M.P. Scott, A Bretscher, H. Ploegh, P. Matsudaira.
12. Sixth Edition, Molecular Cell Biology. W. H. Freeman and Co., N. Y .2008.
13. Pollard, T. D. and W. C. Earnshaw. 2002. Cell Biology. Saunders
14. Wolfe, A. 1995. Chromatin: Structure and function. Academic Press, N. Y.



HCT-2.3: PARASITOLOGY

Introduction: Concept of Parasitism, Origin and evolution of Parasitism, Types of animal relationships or symbiotic relationships, Types of parasites and hosts.

Life cycle, transmission and pathogenicity of protozoan parasites. Entamoeba histolytica and Trypanosoma, Leishmania, Trichomonas, Plasmodium and Taxoplasma.

Morphology, Habitat, Lifecycle, Pathogenicity and Prevention of Ectoparasites. a) Ticks b) Mites c) Flee d) Mosquitoes.

Unit II:

16 Hrs

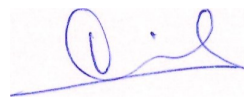
Trematodes: schistosoma, Fasciola, Echinostome, Cestoda : Teania, Echinococcus, Hymenoptira.

Nematodes: General morphology, Biology and Distribution of Nematodes, Economic importance of Nematodes of Human, animals and insects.

Morphology, Lifecycle and medical importance of diseases transmitted vectors and their control measures : Aedes, Culex, Anopheles, Housefly, Chikun gunya, Hepatitis.

Unit III: 16 Hrs Diseases transmitted by bacteria for cholera and tuberculosis. Diseases transmitted by virus for dengue fever, hepatitis and KFC).

Important nematode pest and parasites, nematode diseases of man and animals and their control measures (eg. Ascariasis, Trichonella, Enterobios, Wacheriosis)



PRACTICAL COURSE IN

Unit IV: 16 Hrs Nematode parasite of plants and their morphology, Lifecycle and infects of crop plants. Root Knot nematode, Burrowing nematode, Citrus nematode, Stem and bulb nematodes.

Gall nematodes, foliar nematodes, ectoparasitic nematodes, virus transmitting nematodes, pathogenesis, types and management of nematode issues.

HCP-2.3: PARASITOLOGY BASED ON HCT- 2-3

1. Study of Protozoan Parasites of Human and Domestic Animals.
2. Staining blood films for the study of protozoa (especially malarial parasite).
3. Collection of specimen for the study of Parasites.
3. Study of Intestinal Parasites of frog and insects.
4. Preparation of permanent slides of the hard parts of insects
5. Study of vectors and their mouth parts: a) Mosquito b) Flea c) Ticks d) Housefly e) Cockroach
6. Study of Ectoparasites - Lice, Leech, Ticks and Mites.
7. Study of Helminthes parasites - Taenia, Wucheria, Fasciola, Ascaris, Anaylostoma .
8. Slides and Specimens : Pathogens of Malaria, Filariasis, Leishmaniasis, Trypanosomiasis, Ascariasis. Diseases of Liverfluke, Tapeworm, etc
9. Field visit to collect the soil samples and isolation and identification of important nematodes
10. Any other practical depending upon feasibility

Reference Books Recommended:

1. Smyth, J.D 2000. Animal Parasitology, Cambridge low Edition.U.K.
2. Arira, DR. And Arora,B. 2001. Medical Parasitology. 1st Edition. Satish kumar jain for CBS Publisher ad Distributors, New Delhi.
3. Chatterjee, K.D. 2001. Parasitology (Protozoology and Helminthology). 12th Edition. Chatterjee Medical Publishers, Calcutta.
4. Thomas C. Cheng. 1999. General Parasitology. 2nd Edition. Academic Press, California.
5. Solti,R.C.1999. Medical Zoology. Shoban Lal Nagin Chand & Co. Jalandhar. India.
6. Roberts L.S. and Janovy J. Foundations of Parasitology, McGraw-Hill Publishers, New York, USA.
7. Modern Parasitology: A Textbook of Parasitology, FEG Cox., Wiley-Blackwell, U. K.
8. Qaise H. Baqri and M.Shami Jairajpuri, 195 , Bibliography of Nematology of India. CBS publishers.
9. Ravichandra N.C., 201 Methods and Techniques in Plant Nematology.



Unit I:

16 Hrs

SCT- 2.1a: IMMUNOLOGY

Introduction to immunity:

History; Types of Immunity —Innate and Acquired immunity.

Cells and Organs of Immune System:

Immune Cells:

Lymphocytes (T & B cells), Monocytes, Macrophage; Eosinophils, Basophils, Neutrophils and Mast cells.

Primary and secondary lymphoid organs:

Bone marrow, Thymus, Spleen and Lymph nodes

Unit II:

16 Hrs

Antigens:

Antigens, factors influencing immunogenicity, Adjuvant, Epitope, Hapten;

Immunoglobulins:

Basic structure of the immunoglobulin; Types and functions of Immunoglobulins, Monoclonal antibodies.

Antigen-antibody reactions and Immunotechniques:

Agglutination; Precipitation; Immunofluorescence;RIA; ELISA, Immuno-electrophoresis and Western blotting.

Unit III:

16 Hrs

Immune response:

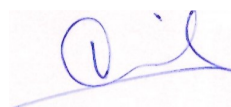
Humoral and cell mediated immune responses,Primary and secondary immune modulation; Cytokines; Role of complement system in immune response (Classical pathway, Alternate pathway); Immune response against bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections; congenital and acquired immunodeficiencies; Autoimmune disorders.

Unit IV:

16 Hrs

Major Histocompatibility complex (MHC) and Hypersensitivity:

Transplantation and graft rejection, Genetic organization of I-E and H-2 complexes, H-2A typing; Immediate and delayed hypersensitivity.



PRACTICAL COURSE IN

Vaccines and Vaccination:

Types of vaccines and their significance; Vaccine delivery systems.


SCP-2.1a:

IMMUNOLOGY BASED ON THE SCT-2.1a

1. Study of cells and organs of the immune system.
2. Haemagglutination test for blood group determination.
3. Determination of differential count of WBC.
4. Determination of total count of WBC using haemocytometer.
5. Estimation of the haemoglobin content by cyanmethaemoglobin method.
6. Separation of serum from the blood
7. Separation of plasma from the blood.
8. Purification of IgG from the serum.
9. Determination of antibody titre.
10. Electrophoretic separation of serum/plasma proteins. 1 1 . Immunochromatography technique to detect
 - a. Hepatitis-B virus
 - b. HCG in urine sample for pregnancy
 - c. HIV (tri-dot assay)
12. Radial immunodiffusion test to detect the concentration of unknown antigen.
13. Ouchterlony double diffusion test to detect the concentration of unknown antigen.
14. Demonstration of ELISA
15. Any other practical depending upon feasibility

Reference Books Recommended:

1. Austyn, J.M. and Kathym, J. Wood. 1993. Principles of Cellular and Molecular Immunology. Oxford University Press. Oxford.
2. Benjamin, Elisunshine, Geoffrey Leskowitz. 1996. Immunology: A short course. 3rd Edition. New York.
3. Kubey, J.M. 1990. Essential Immunology. 6th Edition. Blackwell Scientific Publication, New York.
4. Rao, C.V. 2002. An Introduction to Immunology. Narona Publishing House, New Delhi.
5. Rotti, I. 1994. Essential Immunology. Blackwell, London.



6. Stibes, D.P. and Terr, Al. 1991. Basic and Clinical Immunology. 7th Edition. Appleton and Large. California.

Unit I:

16 Hrs

SCT-2.1b: BIOCHEMISTRY

Introduction:

Scope, structure of atoms, molecules and chemical bonds (covalent, coordinate, ionic and hydrogen bonds); stabilizing interactions (Vander-Waals, electrostatic, hydrogen bonding, hydrophobic interaction); principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties); normality and molarity of solutions.

Nucleic acids:

Composition, functions; synthesis and metabolism, salvage pathways, its regulation and diseases.

Unit II: 16 Hrs Carbohydrates:

Composition, structure, functions and metabolism: Glycolysis, Citric acid cycle, Oxidative phosphorylation; Gluconeogenesis, Glycogenolysis, Regulation of blood sugar, Impaired Glucose Tolerance, Glycosuria, Insulin, Glucagons, Diabetes mellitus, Lactic acidosis, Glycated hemoglobin. Inborn errors associated with carbohydrate metabolism.

Unit III: 16 Hrs Proteins:

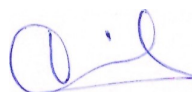
Composition, conformation of proteins (primary, secondary, tertiary and quaternary structure; domains; motif and folds); functions and metabolism: Transamination, Deamination, oxidative deamination, Urea cycle and Transmethylation.

Lipids:

Composition, structure, metabolism: Oxidation of fatty acids (Alpha and Beta oxidation), Prostaglandins, Cholesterol, Hypercholesterolemia, Lipoproteins, Atherosclerosis. Disorders of lipid metabolism.

Unit IV: 16 Hrs Vitamins: Composition, structure, functions, metabolism Enzymes:

Principles and mechanism of enzyme catalysis, enzyme and enzyme kinetics, isozymes, factors affecting enzyme activities, feedback and allosteric inhibition enzyme regulation, role of C-AMP in regulation, Clinical and industrial applications of enzymes.



SCP-2.1b: PRACTICAL'S COURSE IN BIOCHEMISTRY BASED ON THE SCT-

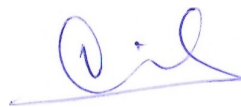
2.1b

1. Qualitative analysis of carbohydrates (Starch, Glycogen, Sucrose, Lactose, Maltose, Glucose, Fructose).
2. Qualitative analysis of proteins (Egg albumin, Casein, Gelatin, Peptone)
3. Precipitation reaction of proteins (Egg albumin, Peptone)
4. Estimation of amino acids by Sorenson's Formal titration (Arginine, Alanine, Leucine, lysine etc.,)
5. Demonstration of Beer Lambert's law (Methylene blue, Safranin etc.,).
6. Determination of concentration of Glucose and Maltose by calibration curve.
7. Determination of amylase activity.
8. Determination of effect of temperature, pH and incubation period on amylase activity.
9. Any other practical depending upon feasibility

Reference Books Recommended:

1. Conn E.E, Stumpe P.K, Bruening G and Dol. R.G. 1995. Outlines of Biochemistry. John Wiley, Singapore.
2. David I.-Nelson and M.M.Cox. 2000.Principles of Biochemistry. 3rd Edn. Worth Publishers, 41, Madison Avenue, NY.
3. Harper HA. 1993.A Review of Physiological Chemistry, Lange Medical Publication, 2nd Edn.
4. Lehninger AL, Nelson D.L and Cox M.M, 2nd Edn. 1993. Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.
5. Lubert Stryer. 1995. Biochemistry 4th Edn W.H.Freeman & Co.
6. Plummer, D. T. 1993. Practical Biochemistry, 3rd Edn. Tata McGraw Hill Publishing Co., Ltd. New Delhi.

Total:



OET- 2.1a: ECONOMIC ZOOLOGY

32 Hrs

Unit I:

16 Hrs

Introduction: Importance of Economic Zoology

Vermiculture: Establishment of vermiculture unit; Earthworm as a tool for the conversion of biodegradable waste into vermicompost; Earthworms as poultry and fish feed; Vermiwash.

Beekeeping: Beekeeping practices in India; Foraging and colony organization in honeybees; Composition and uses of honey and bee products.

Sericulture: Importance of sericulture as a rural industry; Life cycle of *Bombyx mori*; Modern rearing methods, reeling, grading and marketing. Lac culture: Cultivation and uses of lac.

Unit II: 16 Hrs Fisheries:

Culture of major carps and exotic carps; Off-shore fisheries-Sardin; Composite fish culture; Ornamental fishes; Pearl culture; Fish by-products.

Poultry keeping:

Different breeds of chicken and different breeding systems; Egg production and economics.

Pest management:

Pests of economically important crops; Household pests; Damages caused by pests; Integrated Pest Management (PM)- Different components and general idea about the bio-control agents; Vertebrate (birds and rodents) pest management.

Reference Books Recommended:

- 1 Sathe T.V. Vermiculture and Organic farming
2. Imms AD General Text Book of Entomology. Vol I & II Chapman & Hall London
3. Jhingran VG. Fish and Fisheries of India. Hindustan Publishing Corporation New Delhi
4. Mishra RC Prospectives in Indian Apiculture Allied Scientific Publication
5. Pedigo LP Entomology and Pest Management IV Edition Prentice — Hall Publication
6. Srivastava KP Text book of Applied Entomology Vol I & II Kalyani Publication Von Embden I-IF Pest Control 2nd Edition Cambridge University Press
7. Alford: A textbook of Agricultural Entomology, Blackwell Science Ltd. 1999
8. Dhaliwal and Arora: Trends in Agricultural Insect Pest Management, Commonwealth Publ., New Delhi, 1994



9. Tazima. Y. 1958. Silkworm egg. CSB Publication, Bombay.
10. Yashimoro Tanaka. 1964. Sericology, CSB Publication, Bombay.
11. Tanaka, Y. 1953. "Genetics of the silkworm, Bombyx mori" — advances in genetics, Demerec.M. (Ed), Vol.5, Academic press, New York.
12. Tazima, Y. 1964. "The genetics of the Silkworm". Logos Press Ltd., London.
13. Tazima, Y. 1978. The silkworm an important laboratory tool. Kodnasha Ltd., Tokyo.

OET- 2.1b: ANIMAL BEHAVIOUR

Total: 32 Hrs

Unit-I: 16 Hrs

Introduction to Animal Behavior: Introduction, Definition & history (Lorenz, Tinbergen, Karl von Frisch). Diversity and Unity in the study of behavior and complex behavior. Significance of study of animal behavior. Neural aspects of behavior.

Types of animal behavior: Types of behavior: Innate and acquired behavior. Genetic basis of behavior, Stereotyped behavior: Kinesis, taxis, orientation & reflexes. Social organization in insects.

Unit-II: 16 Hrs
 Motivation and Communication: Motivation, Models of motivation drive. Migration and Homing with special reference to birds. Chemical, Visual, tactile and audible communication. Communication, Functions of communication. Application of pheromones and their biological actions in invertebrates and vertebrates.

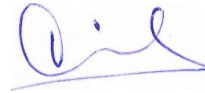
Ecology and Behavior: Ecological aspects of Behavior — Habitat selection, food selection, anti — predator defense mechanism. Aggression, territoriality, dispersal, Parental care and mating, courtship behavior systems. Social organizations in Primates.

Reference Books Recommended:

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 Behavior 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.

Total:

6. Evolution by Dobzhansky, Ayala, Stebbins, Valentine.

A handwritten signature in blue ink, appearing to be 'O. L.', with a horizontal line underneath.