RUR New CBCS

Department Copy

MCT 2 units
SCT
OE - 2 units.

RAICHUR UNIVERSITY

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RAICHUR UNIVERSITY, RAICHUR

Regulations and Syllabus

for

P.G.DEPARTMENT OF STUDIES IN ZOOLOGY

(I-IV Semesters)

(Under Choice Based Credit System)

w.e.f.
(2023-24 onwards)

Deputy Registrar Office (Academic) ★ Adikavi Sri Maharshi Valmiki University ★ RAICHUR

Coordinator
Dept. of Zoology
ASMVU, Raichur.

SEMESTER- II

HCT-2.1: GENETICS AND BIOSTATISTICS

Total: 64 Hrs

16 Hrs

Unit-I:

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 differentiation:

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.

16 Hrs

Unit-II:

Genetic materials, linkage, crossing over and sex linked inheritance:

DNA structure (Watson and Crick model of DNA helix, conformational flexibility of DNA molecules); semiconservative replication of DNA.

Linkage; Crossing over; Chromosome mapping; Molecular mechanism of crossing over; Gene conversion.

Sex linked inheritance (sex linkage in *Drosophila*, X-linked traits in Humans).

16 Hrs

Unit-III:

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 & 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 organization: Salient features of yeast, *Drosophila* and human genome.

16 Hrs

Unit-IV:

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, ANOVA.

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: PRACTICAL COURSE IN GENETICS AND BIOSTATISTICS BASED ON HCT-2.1

A: Genetics:

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

B: 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 correlation coefficient.
15) Any other practical depending on feasibility

REFERENCE BOOKS RECOMMENDED:

1. Genes VIII Benjamin Lewin Prentice – Hall Publications
2. Principles of Genetics 6th Edition Snustard and Simon Willey Publications
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. Kringer, 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 Jm., Tymoczko JL., Strayer L.. W.H. Freeman Publications
8. Lahninger's Principles of Biochemistry 6th Edition. Michael M. Cox and David Nelson Macmillan Publishers.
9. Bailey, N.T.J. Statistical Methods in Biology. 3rd ed. Cambridge University Press. U.K., 2000.
10. Snedecor ,G.W and Cochran, W.G. Statistical Methods . Ed VI. Oxford and IBH Publishing co, New Delhi, 1967.

HCT 2.2: MOLECULAR CELL BIOLOGY

Total: 64 Hrs

16 Hrs

Unit-I:

Introduction to the cell: The origin and evolution of the cell, Prokaryotes to Eukaryotes.

Membrane ultra-structure and functions:

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.

16 Hrs

Unit-II:

Structural organization and functions of cell organelles, protein sorting and cytoskeleton:

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

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 secretary pathway, protein sorting in the Golgi, traffic in the endocytic pathway, exocytosis.

The cytoskeleton:

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

16 Hrs

Unit-III:

Molecular organization of nucleus and chromosome:

Ultra structure and function of nucleus; Chromosome, Heterochromatin and Euchromatin, Centromeres. DNA packaging and organization, Polytene chromosomes, Lamp brush Chromosomes, Nucleolus.

Cell cycle:

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

Cell signalling:

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

16 Hrs

Unit-IV:

Programmed cell death:

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.

HCP- 2.2: PRACTICAL COURSE IN MOLECULAR CELL BIOLOGY BASED ON HCT-2.2

1) Study of temporary mounting of tissue:
   a) Squamous epithelial tissue, ciliated epithelial tissue and columnar epithelial tissue
   b) Myelinated and non-myelinated nerve cells
   c) Smooth muscle, striated muscle and cardiac muscle
   d) Bone and cartilage
   e) Blood cells – Neutrophils, Basophils, Eosinophils, Lymphocytes and Monocytes
2) Estimation of DNA by Diphenylamine (DPA) method
3) Estimation of RNA by Orcinol 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) Localization of mitochondrial DNA by using Jenus Green stain
9) Histo-pathological examination (HPE) of Normal and malignant cells.
10) Study of Barr body using buccal smear
11) Cell Death during development (Apoptosis).
12) Any other practical depending on feasibility

REFERENCE BOOKS RECOMMENDED:

1. Molecular Biology of Cell. Alberts B. Johnson A. Lewis J. Raff M. Robert K and Walter P.
2. Molecular Cell Biology. Lodish. Berk. Kaiser. Kringer, Scott Bretscher, Ploegh, Matsudaira. 6th Edition. Freeman Publications
3. The Cell: A Molecular Approach 2nd Edition AMS Press Washington, 2000
4. De Robertis EDP and 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
7. Alberts, B., A. Jhonson, J. Lewis, M. Raff, K. Roberts and P. Walter Molecular Biology of the Celi. V Ed. Garland Science, New York. 2008.
8. Brachet, J. Molecular Cytology, Academic Press, N. Y., 1985.
9. Furukawa, R., and M. Fechheimer. The Structure, Function and Assembly of Actin Filament Bundles. Int. Rev. Cytol. 175: 29-90, 1997.
10. Lodish, H., A. Berk, C.A Kaiser, M.P. Scott, A Bretscher, H. Ploegh, P. Matsudaira. Sixth Edition, Molecular Cell Biology. W. H. Freeman and Co., N. Y.2008.
11. Pollard, T. D. and W. C. Earnshaw. Cell Biology. Saunders, 2002.
12. Wolfe, A. Chromatin: Structure and Function. Academic Press, N. Y., 1995.

HCT-2.3: PARASITOLOGY

Total: 64 Hrs

16 Hrs

Unit-I:

Introduction: Concept of parasitism; Origin and evolution of parasitism; Types of animal relationships or symbiotic relationships; Types of parasites and hosts.

Protozoan parasites: Life cycle, transmission and pathogencity of protozoan parasites; *Entamoeba histolytica* and *Trypanosoma, Leishmania, Trichomonas, and Plasmodium.*
Trematodes: *Schistosoma, Fasciola*; **Cestoda:** *Teania, Echinococus.*

16 Hrs

Unit-II:

Ectoparasites: Morphology, habitat, lfecycle, pathogenecity and prevention of ectoparasites;
a) Ticks b) Mites c) Flee d) Mosquitoes.

Insect vectors: Morphology, Life cycle and medical importance of disease transmitting insect vectors and their control measures; *Aedes, Culex, Anopheles*, Housefly.

16 Hrs

Unit-III:

Diseases Transmitted by bacteria: Cholera and Tuberculosis.
Diseases Transmitted by virus: Dengue fever, Hepatitis and KFD.

Nemotodes: General morphology, biology and distribution of nematodes, Economic importance of Nematodes of human, animals and insects.

Important nematode pests and parasites; Nematode diseases of man and animals and their control measures (Ascariasis, Trichinellosis, Enterobiosis, Wuchereriasis)

16 Hrs

Unit-IV:

Nematode parasite of plants and their morphology, Life cycle 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: PRACTICAL COURSE IN 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 parasites (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 ecto-parasites - Lice, Leech, Ticks and Mites.
7. Study of helminthes parasites - *Taenia, Wucheria, Fasciola, Ascaris, Ancylostoma* .
8. Slides and specimens: Pathogens of Malaria, Filariasis, Leishmaniasis, Trypanosomiasis, Ascariasis. Diseases of Liver fluke, Tapeworm etc.
9. Field visit to collect the soil samples and isolation and identification of important soil nematodes
10. Any other practical depending on feasibility

REFERENCE BOOKS RECOMMENDED:

1. Smyth, J.D. Animal Parasitology, Cambridge low Edition.U.K., 2000
2. Arora, D.R. and Arora, B. Medical Parasitology. 1st Edition. Satish kumar jain for CBS Publisher ad Distributors, New Delhi, 2001.
3. Chatterjee, K.D. Parasitology (Protozoology and Helminthology). 12th Edition. Chatterjee Medical Publishers, Caicutta, 2001.
4. Thomas C. Cheng. General Parasitology. 2nd Edition. Acdemic Press, California, 1999.
5. Sobti, R.C. Medical Zoology. Shoban Lal Nagin Chand & Co. Jalandhar. India, 1999.
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, Bibliography of Nematology of India. CBS Publishers, 1995.
9. Ravichandra N.G. Methods and Techniques in Plant Nematology, 2001.

SCT- 2.1a: IMMUNOLOGY

Total: 64 Hrs

16 Hrs

Unit-I:

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; Eosinophills, Basophills, Neutrophils and Mast cells.

Primary and secondary lymphoid organs:

Bone marrow, Thymus, Spleen and Lymph nodes.

16 Hrs

Unit-II:

Antigens:

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

Immunoglobulins:

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

Antigen-antibody reactions and immune-techniques:

Agglutination; Precipitation; Immunofluorescence; RIA; ELISA, Immunoelectrophoresis and Western blotting.

16 Hrs

Unit-III:

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 immune-deficiencies; Autoimmune disorders.

16 Hrs

Unit-IV:

Major histo-compatibility complex (MHC) and hypersensitivity:

Transplantation and graft rejection, Genetic organization of H2 and HLA complexes, HLA typing; Immediate and delayed hypersensitivity.

Vaccines and vaccination:

Types of vaccines and their significance; Vaccine delivery systems.

SCT-2.1b: BIOCHEMISTRY

Total: 64 Hrs

Unit-I: **16 Hrs**

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 of nucleic acids, 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 of vitamins.

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-2.1a: PRACTICAL COURSE IN 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 cyanmethemoglobin 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.
11. 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 on feasibility

REFERENCE BOOKS RECOMMENDED:

1. Austyn, J.M. and Kathym, J. Wood. Principles of Cellular and Molecular Immunology. Oxford University Press. Oxford, 1993.
2. Benjamin, Elisunshine, Geoffrey Leskowitz. Immunology: A Short Course. 3rd Edition. New York, 1996.
3. Kubey, J.M. Essential Immunology. 6th Edition. Blackwell Scientific Publications, New York, 1990.
4. Rao, C.V. An Introduction to Immunology. Narona Publishing House, New Delhi, 2002.
5. Rotti, I. Essential Immunology. Blackwell, London, 1994.
6. Stibes, D.P. and Terr, A.I. Basic and Clinical Immunology. 7th Edition. Appleton and Large. California, 1991.

SCP-2.1b: PRACTICAL 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, Safranine *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 on feasibility

REFERENCE BOOKS RECOMMENDED:

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

OET- 2.1b: ANIMAL BEHAVIOUR

Total: 32 H

16 H

Unit-I:
Introduction to animal behavior:

Introduction, Definition and history (Lorenz, Tinbergen and Karl von Frisch); Diversity and unit the study of behavior and complex behavior, Significance of study of animal behavior, Ne aspects of behavior.

Types of animal behavior:

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

16

Unit-II:
Motivation and communication:

Motivation, Models of motivation drive. Migration and homing with special reference to b Chemical, visual, tactile and audible communication. Communication, functions of communica Application of pheromones and their biological actions in invertebrates and vertebrates.

Ecology and behavior:

Ecological aspects of behavior – Habitat selection, Food selection, Anti –predator def mechanism. Aggression, territoriality, Dispersal, Parental care and mating, Courtship beh 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, 1
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.
6. Eibl-Eibesfeldt, I. Ethology. The Biology of Behaviour. Holt, Rhineheart and Winston, Newy
7. Gould J.L. The mechanism and evolution of behavior.
8. Hinde R.A. Animal Behaviour: A synthesis of Ethology and Comparative Psychology. Mc G Hill, New York.
9. Bradbury J.W. and S.L. Vehrencamp. Principles of Animal Communication. Sinauer Assoc Sunderland, Massachusetts, USA.
10. Alcock J.W. Animal Behaviour: An Evolutionary approach. Sinauer Associates, Sunderlanc Massachusetts, USA.

OET- 2.1a: ECONOMIC ZOOLOGY

Total: 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 organic waste into vermicompost; Earthworms as supplementary feed for poultry and fish; Vermiprotein and Vermiwash.
Beekeeping: Beekeeping practices in India; Foraging and colony organization in Honeybees; Composition anduses 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 (IPM)- 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 Champman & 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 Publications
6. Srivastava KP Text Book of Applied Entomology Vol I & II Kalyani Publication Von Embden HF 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 Publications, New Delhi, 1994
9. Tazima. Y. 1958. Silkworm egg. CSB Publication, Bombay.
10. Yashimoro Tanaka. Sericology, CSB Publication, Bombay, 1964.
11. Tanaka, Y. "Genetics of the Silkworm, Bombyx mori" – advances in genetics, Demerec.M. (Ed), Vol.5, Academic Press, New York, 1953.
12. Tazima, Y. "The Genetics of the Silkworm". Logos Press Ltd., London, 1964.
13. Tazima, Y. The Silkworm an Important Laboratory Tool. Kodnasha Ltd., Tokyo, 1978..