

P.G. 4th SEMESTER SYLLABUS
DEPARTMENT OF ZOOLOGY
COTTON UNIVERSITY

PAPER: ZOO1001C

EVOLUTIONARY AND APPLIED ANIMAL BIOLOGY
(Credits: 3+0+1=4)

A. GENERAL AND MOLECULAR EVOLUTION (25L)

Unit 1: General evolution (15L)

1.1: Non- Classical theory of evolution 3L

1. An overview of evolutionary thoughts, developments and the concept of synthetic theory 2. Basic concept of synthetic theory with reference to Hardy-Weinberg equilibrium in populations.

1.2: Other theories of evolution 7L

1. Goldschmidt's concept of micro- and macroevolution; 3. Macroevolution & concept of phylogenetic gradualization 5. Speciation: Biological & phylogenetic species concept, allopatric speciation, sympatric speciation & parapatric speciation, 6. Reproductive isolation mechanism.

1.3: Evolution of eukaryotes : 5L

1. Concept of evolution of eukaryotes 2. Zenith of insect evolution & Evolution of sociality in insect society 3. Evolutionary origin of fishes, tetrapod, bird & mammals.

Unit 2: Molecular & genome evolution (11L)

2.1: Molecular evolution 5L

1. Molecular concept of Origin of life & Origin of molecular divergence (protein & nucleotides); RNA world 2. Concept of evolution of Molecular clock & molecular drive.

2.2: Genome evolution 6L

1. Genome evolution: Evolution of multi gene family, Acquisition of new genes, Exon theory & mechanisms 4. Gene duplication, Kimura's hypothesis & divergence, 5. Genetic variation in population, Causes of genetic variation, genetic polymorphism & measuring genetic variation

B. APPLIED ZOOLOGY & AQUACULTURE (23L)

Unit 3: Applied entomology (9L)

3.1: General application of insects 5L

1. Insect as pollinators in agriculture 2. Role of insects in tropical forest ecosystem. 3. Lac & silk products & industrial economy 3. Insect as bioreactors & insect in cell culture

3.2: Medical & forensic entomology 4L

1. Pests of public health importance and their control (Mosquitoes, house flies, bad bugs, fleas) 2. Insect borne diseases

Unit 4: Economic zoology (14L)

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4.1: General economic zoology 8L

1. Solid waste management with vermicompose, 4. Organic farming 5. Biology and importance of finfish (Indian major carps, freshwater catfish) and shellfish (Prawns and shrimps). 6. Composition and nutritive value of raw fish, processed fish & preserved fish 7. Ornamental fishes, Exotic & indigenous ornamental fish & economic importance, 8. Honey bee products & economy.

4.2: Medical zoology 3L

1. Preliminary knowledge on zoonotic diseases 2. Genetics of Neurological Diseases; Pharmacogenetics and application 3. Venom & allergens-types, delivery & medical application

4.3: Aquaculture 3L

1. Integrated fish farming-(Fish cum livestock farming & paddy cum fish culture) 2. Polyculture of fish for high yield 3. Edible oyster & pearl oyster.

PRACTICAL:

1. To study the common pattern of pentadactyl limbs and common ancestry of vertebrates through observation of forelimbs and hindlimbs (frog, Calotes, bird and mammal).
2. Identification of 5 economically important insect specimen belong to different order.
3. Identification and study of morphological differences of any three economically important fish species i.e., Major carps, exotic, indigenous, ornamental and medicinally important fishes.
4. Study and identification of at least two insects and two venomous snakes and their impact.
5. In silico analysis of phylogenetic tree of 5 vertebrate animals.
6. Estimation of protein and lipid from edible insect/any marketable fish.
7. To study the median threshold concentration of glucose solution in feeding response in ants.
8. Study of learning behaviour in mice by using zig-zag or T-shaped maize/ To study the geotaxis behaviour of earthworm.

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(Special Paper)

PAPER: ZOO1002SP1

CELL & MOLECULAR BIOLOGY - II
(Credits: 3+0+2=5)

A. MOLECULAR BIOCHEMISTRY

Unit 1: Molecular Biochemistry (17L)

1.1: DNA structure & reaction of DNA 8L

1. Helix parameter of DNA (A, B, C and Z DNA), triplex DNA, Interrupted DNA & functional role 2. Biological significance of double strandness, DNA re-association kinetics (Cot curve analysis) 3. Supercoiling of DNA & Topoisomerase I & II, C-value paradox 4. DNA replication (inhibition, elongation & termination) in eukaryotic & prokaryotic cells 5. Telomere shortening & its replication 6. Gene library – Construction of C-DNA & genomic library. 7. Isolation and sequencing of DNA, Maxam-Gilbert, Sanger's dideoxy methods.

1.2: RNA & Transcription 4L

1. Transcription in Prokaryote and Eukaryote 2. Transcription factors-RNA binding motif and proteins, Activators and repressor of transcription 3. Post transcriptional processing (Capping, Tailoring, splicing and alternate splicing, mRNA Stability, RNA degradation, RNA editing) 4. Transcription Attenuation and RNA Export

1.3: Protein and Translation 5L

1. Protein folding: enzymes for protein folding, processing and thermodynamics Ramachandran plot. Molecular chaperonin and chaperones 2. Prion structure and function. 3. Translation machinery: Translation in prokaryotic and eukaryotic, fidelity of translation and post-translational modification. 5. Protein sequencing method.

B: GENOME ORGANIZATION

Unit 2: Genome Organization and gene expression: 8L

1. Organization of genome in prokaryotic and eukaryotic cells. 2. Genetic features of nuclear genome, organelle genome organization - mitochondria and chloroplast, virus genome and mobile DNA element (Transposable element, IS element, P element, retrovirus and retro-transposome). 3. Mapping of genome – physical and genetic mapping. 4. Genome sequencing and High-throughput screening and sequencing {next-Gen}, Genetic markers. 5. Genome analysis technique (RFLP, AFLP, RAPD, ISSR) and Pedigree Analysis. 6. Gene silencing (DNA methylation and acetylation, doses compensation, histone code, RNA Interference, antisense RNA) and gene amplification.

Unit 3: Molecular diseases: (6L)

3.1: Neurodegenerative disease:

1. Molecular pathways to neurodegeneration. 2. Misfolding and aggregation of disease proteins- Parkinson, Alzheimer & Huntington's disease.

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3.2: Metabolic disorders:

1. Molecular mechanisms of metabolic diseases - inborn errors of metabolism, Alkaptonuria, Phenylketonuria

C: APPLIED MOLECULAR BIOLOGY

Unit 4: Applied Molecular Biology (16L)

4.1: Cell & tissue culture technique 3L

1. Cell culture media properties & preparation 2. Primary & secondary cell culture, continuous cell lines- lymphocytes & fibroblast cell culture, cell separation by FACS 3. Application of animal cell culture (in-vitro drug testing).

4.2: Stem cell biology 3L

1. Properties and types of stem cells (embryonic, umbilical, adult), Haemopoietic stem cells and formation of blood cells, bone marrow transplantations. 2. Stem cell disorders - Stem cell therapy, Stem cell and cancer, Stem cell research in India. 3. Stem cells and tissue engineering - ethical, legal and social implications (ELSI) of stem cell technology.

4.3: Application of Molecular Biology 10L

1. Concept of System biology - Transcriptomics, proteomics, metabolomics, lipidomics, glycomics, and phosphoproteomics. 2. Nano biology & application - Elementary concept of nanotechnology and its applications, bio-inspired nanomaterials for a new generation of medicine and nanoscience in medicine, vaccine and delivery system, nanoparticles in medical detection and diagnoses. 3. Antisense and ribozyme technology 4. Hybridization techniques – Southern- Northern hybridization, Chromosome painting, FISH, DNA chip technology. 5. Gene therapy & application - (Gene therapy for inherited immunodeficiency syndromes, Cystic fibrosis and HIV-1 gene therapy, Retroviral mediated gene transfer.)

PRACTICAL: Credit- 2

1. Preparation of different types of buffer & cell culture media used in molecular biology.
2. Procedures of autoclaving of materials required in molecular techniques.
3. Demonstration of Agarose Gel Electrophoresis for DNA and its visualization.
4. Isolation of genomic DNA from mouse liver cell.
5. SDS-poly acrylamide Gel Electrophoresis for protein and its visualization.
6. Short-term culture of whole blood & lymphocyte culture from mammalian blood/bone marrow cell.
7. Histochemical detection of DNA by Feulgen reaction/DNA, RNA from animal tissues by Methyl green pyronin method.
8. Biochemical estimation of DNA (diphenyl method) and RNA from blood and tissue collected from slaughter house.
9. Biochemical estimation of alkaline phosphatase & LDH.
10. Isolation of mitochondria by ultracentrifugation technique from suitable tissue material.
11. In silico designing of primer 16 sRNA, 18 sRNA, degenerate and specific primer, n/p blast.
12. Study of molecular evolution and construction of Phylogenetic tree, in silico.

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13. In silico study of DNA microarray technique.
14. Visit to advanced laboratory/ institution (Report to be submitted)
15. Practical record book & viva voce.

Books recommended:

1. T.A. Brown: Genomes 3 (2nd Ed.), Gerald publication, 2009
2. J.D. Watson et al.: Molecular Biology of the Gene (4th Edn.) Benjamin/Cummings Pub Co. (2010)
3. R.R. Sinden: DNA Structure and Function, Academic Press, 1998
4. D.L. Hartl and E.W. Jones: Essential Genetics: A Genomic Perspective, Jones and Bartlett (2002)
5. B. Lewin: Genes VIII, Prentice Hall; Tenth edition (2004)
6. B. Alberts et al. Gerald Publications; 6th Edn. (2014)
7. J.F. Atkins et al.: RNA Worlds: From Life's Origins to Diversity in Gene Regulation Cold Spring Harbor Laboratory Press, U.S.; 1st Edn. (24 September 2010).
8. V. Ramamurthy and S. Raveendran, Fundamentals of Biochemistry, Aruna Publications, Koradacherry (2010)
9. J.L. Jain, Fundamentals of Biochemistry, S. Chand and Co. Ltd. New Delhi.
10. L. Stryer, Biochemistry, W.H. Freeman and Co. New York. (1988)

PAPER: ZOO1002SP2

ECOLOGY AND WILDLIFE BIOLOGY - II
(Credits: 3+0+2=5)

(WILDLIFE MANAGEMENT AND CONSERVATION) (48L)

Unit – 1: Definitions and Acts, Ecological Role of Wildlife (13L)

1.1 Definitions and acts 7L

1) Wildlife Conservation Models, Human Wildlife Conflict and Its Impact on Natural Systems, Eco-Tourism, 2) Indian Constitution Provisions of Environment Protection, 3. CITES, CMS, Legal Definitions of Forest, Biodiversity, Wildlife Crime, Conservation Breeding, Importance of DNA Bar-coding and Forensic, 4. Major Groups of Mammals, Social Structure in Elephants, Tiger, Gibbons, 5. Birds: Residential and Migratory birds, Endangered and Threatened birds of N.E India, Migratory Routes, 6. Food and Feeding Behaviour of : Rhino, Gibbon, Golden Langur, Leopards, Pigmy hog.

1.2 Ecological Role of Wildlife 6L

1) Mega Herbivore, Elephants as Ecological Engineer, Ecological Role of Water Buffalo, 2) Key Stone Species, Umbrella Species, Flagship Species: Its Importance and Its Conservation, 3) Foraging Strategies, Optimal Foraging Theory, 4) Ecological Role of Herpato- Fauna and Climate Change .

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Unit-2: Wildlife Habitat, Conservation Biology (17L)

2.1 Wildlife habitat 8L

1) PA Network in India, Other Habitat Conservation Initiatives: IBA (Important Bird Area), 2) Habitat Connectivity and Corridors, Source and Sink Population, Meta-Population, 3) Habitat Utilization Pattern of Rhino, Tiger, Pigmy Hog, 4) Wetland and Grassland as Wildlife Habitat, 5) Man- Animal Conflicts: Cause, Impact and Mitigating Measures, 6) Man and Biosphere Programme

2.2: Conservation Biology 9L

1) Introduction of Conservation Genetics, 2) Genetic Management of Wild Population, 3) Genetics and the Fate of Endangered Species, 4) Impact of the Reduction of Population Size: Loss of Genetic Diversity, Inbreeding Depression.

Unit – 3: Wildlife Services 8L

1) Principles of Wildlife Management in Kaziranga and Manas, 2) Ethics of Wildlife Management, 3) Development in the Use and Management of Wild Animals, 4) Estimation of Population Size and Management of Large Herbivores

Unit -4: GIS for Wildlife Management, Wildlife Behaviour (10L)

4.1: GIS for Wildlife Management 5L

1) Assessment and Planning of Wildlife, 2) Wildlife Protection Acts, Wildlife Monitoring through GIS, 3) Wildlife Health and GIS Generating Mitigating Passages, 4) Habitat Maps Using GIS

4.2: Wildlife Behaviour 5L

1) Behavioural Studies of Endangered Species of Birds of N.E India, Its Relation to Ecological Aspects, 2) Primates, Behaviour of Capped Langur, Stump Tailed Macaque, etc. in Wildlife Sanctuaries.

PRACTICALS:

1. Ecological sampling and census technique- Direct and Indirect methods. Field based studies of bird and butterfly census techniques and species identification
2. Study of diversity index, dominance index
3. GIS, GPS and RS technology
4. Soil analysis-N, P, K, macro and micro analysis, soil organic carbon, moisture
5. Water analysis-TDS, Conductivity, TSS, BOD, Chloride, Fluoride
6. Plankton-Limnological studies.
7. Data representation- Construction of composite climatograph and Ergo graphs
8. Taxonomic Study: Study of local birds/ butterflies/herpetofauna.
9. Report on field visit to Biodiversity rich area.

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Recommended Books:

1. Wildlife Ecology and Management Author : Eric G.Bolen and William Robinson,Pearson; 5th Edition (July 20, 2002).
 2. Sacred Ecology Author : Fikret Berbes, Routledge ; 1st Edition (March 2, 2008).
 3. Wildlife Ecology, Conservation and Management, John M. Fryxell, Anthony R.E. Sinclair, Graeme Caughley. Wiley – Blackwell: 3rd Edition (August 11, 2014).
 4. Essentials of Conservation Biology, Richard B. Primack. Sinaeur Associates, Oxford University : 6th Edition (May 9, 2014).
 5. Essential Reading in Wildlife Management and Conservation, Paul R. Krausman, Bruce D. Leopold , Johns Hopkins University Press ; (February 7, 2013).
 6. Traditional Ecological Knowledge and Natural Resource Management, Charles R. Menzies, University of Nebraska Press : (November 1, 2006).
 7. Forest Health and Protection, Robert L. Edmonds, James K. Agee, Robert I. Gara, Waveland Pr Inc : 2nd Edition, (May 1, 2010).
- Remote Sensing for Ecology and Conservation: A Handbook of Techniques (Techniques in Ecology & Conservation) : Ned Horning, Julie A. Robinson, Eleanor J. Sterling, Woody Turner, Sacha Spector Oxford University Press; 1st edition (August 20, 2010)

PAPER: ZOO1002SP3

ENTOMOLOGY - II

(Credits: 3+0+2=5)

(INSECT PHYSIOLOGY & GENETICS; & PEST MANAGEMENT) (48L)

Unit 1: Insect physiology 20L

1. Structure and Physiology of – Integumentary and musculature system, digestive, respiratory and circulatory system, excretory, nervous and reproductive system, 2. Endocrine system and functions: Anatomical organization, hormones, Endocrine control of growth and metamorphosis, reproduction, diapauses, 3. Glands and organs of secretion; Ectohormones: Pheromones and allomones, 4. Immunity in insects: Mechanism of innate immunity, antibacterial immunity; signaling pathways, antiviral immunity: antiviral RNAi response, regulation of antimicrobial peptide gene expression by JAK-STAT pathways; bacterial resistance to insect immunity.

Unit 2: Insect genetics 12L

1. Insect as genetic tool, 2. Genome study in insects: Expression of p-elements in Drosophila, 3. Genetic regulation of insect development

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Unit 3: Pest ecology and management 16L

1. Economically important pest and their status, nature of damage and control measures of pest of cereals, pulse, crops, vegetables, fruits, sugarcane and stored grains, 2. Integrated Pest Management – concept of injury level, economic injury level, and economic threshold level. Tools of pest management and their integration - legislative, cultural, physical and mechanical methods. 3. Chemical control – classification of insecticides on the basis of their mode of entry, mode of action and chemical nature; Organochlorines, organophosphates, carbamates, pyrethroids and botanicals. Development of pesticide resistance, metabolism and degradation of pesticides – Phase I and Phase II reaction, 4. Hormonal control: concept and use of Juvenoids, ecdysoids and IGRs, 5. Biological control: Use of parasite and predators and Use of ectohormones in pest control, 6. Genetic control of vector borne diseases and pests.

PRACTICAL: Credit 2

1. Dissection of male and female reproductive system of cockroach.
2. Dissection of nervous system of grasshopper and cockroach.
3. Mounting of salivary glands of cockroach and honey bee.
4. Alimentary canal of house fly.
5. Mounting of hepatic caeca and Malpighian tubules
6. Mounting of sting apparatus of honey bee
7. Dissection of drosophila imaginal disc, polytene chromosome
8. Preparation and identification of haemocytes
9. Detection of urease
10. Detection of chitin
11. Study of mutant varieties of Drosophila
12. Identification of Rice pest, Tea pest, vegetable pest, stored grain pest etc.
13. Estimation of LD50/LC50 using insects
14. Visit to an advance lab/Institution and submission of report
15. Practical record book and Viva voce

Books Recommended

1. *The Insects: Structure and function*, Chapman, R. F., Cambridge University Press, UK
2. *Physiological system in Insects*, Klowden, M. J., Academic Press, USA
3. *The Insects, An outline of Entomology*, Gullan, P. J. , and Cranston, P. S., Wiley Blackwell, UK
4. *Insect Physiology and Biochemistry*, Nation, J. L., CRC Press, USA
5. *The Complete Book of pesticide management*, Whitford, F., Wiley Interscience, John Wiley and Sons, UK
6. *Safer Insecticides*, Hodgson, E., and Kuhr, R. J., (ed), Marcel Dekker Inc., New York, USA
7. *Pesticide Application Methods*, Matthews, G, A., Blackwell Science, London, UK
8. *Pesticide Biochemistry and Physiology*, Wilkinson, C. F., Plenum Press, New York, UK
9. *Metabolic pathways of agrochemicals Part II*, Roberts, T. R., and Hutson, D. H. The Royal Society of Chemistry, UK
10. *Chemical Ecology of Insects*, Carde, R. T., and Bell, W. J., Chapman & Hall, New York, USA

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11. *Entomology & Pest Management*, Pedigo, L. P., Prentice Hall, New Jersey, USA
12. *Concepts of IPM*, Norris, Caswell-Chen and Kogan, Prentice-Hall, USA
13. *Agricultural insect's pests of the tropics and their control*, Hill, D. S., Cambridge University Press, UK.

PAPER: ZOO1002SP4

FISH BIOLOGY AND FISHERY SCIENCE- II
(Credits: 3+0+2=5)

Unit 1: Fish Growth 9L

1. Factors controlling reproduction and development of fish. 2. The types of fish growth. Length-weight relationship. Annual growth. Factors affecting the age and growth. Condition factor and their significance. 3. Nutritional requirements of fishes: Protein, Carbohydrate, Fat, Vitamin and Minerals. 4. Feed manipulation in fish growth, growth promoter agents., 5. Hepatosomatic index, Gonadosomatic index, Index of fullness, Ponderal index, Index of propagation –their estimation.

Unit 2: Fish Pathology 7L

1. Diseases: definition, disease problem of aquaculture, infectious and non-infectious diseases. 2. Bacterial, fungal, protozoan diseases, their clinical symptoms and prophylaxis., 3. Diseases caused by other factors- hereditary, tumour of hereditary origin, benign and malignant tumour.

Unit 3: Fish Genetics and Fishery Biotechnology 16L

1. Cytogenetics of fishes. 2. Hybridization, Polyploidy, Androgenesis and Gynogenesis in fishes. 3. Population genetics and selection. 4. Sex determination in fishes. 5. Biochemical and molecular techniques and their applications in fisheries. Genetic biotechnology in fish health management. Nutraceuticals and fish health, 6. Gene transfer and transgenic fish., 7. Hormonal biotechnology in aquaculture. 8. Cryopreservation technology. 8. Culture of fish cell lines. Germ cell transplantation techniques.

Unit 4: Limnology 16L

1. Physical and chemical characteristics of fresh water: pH, DO, TA, TH, Free CO₂. 2. Productivity of water bodies: primary, Secondary and Tertiary. Factors affecting primary production., 3. Plankton: its importance in aquaculture. Classification, Structural dynamics and seasonal variation of plankton. Plankton sampling: collection, preservation and identification., 4. Benthos: collection, preservation and identification. Nektons.

PRACTICAL: Credits- 2

1. Estimation of HI, GI, IF, PI and IP.
2. Study of prepared slides of disease causing organisms of fresh water species.
3. Estimation of physical and chemical parameters of fresh water: pH, DO, CO₂, TH.
4. Study of prepared slides of plankton and their structural dynamics.

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5. Study of benthic fauna of fresh water.
6. Estimation of relative and absolute growth, LW relationship and animal growth marks through scales.
7. Isolation of nucleic acids from fish tissue/ blood.
8. Horizontal gel electrophoresis for DNA estimation.
9. Protein extraction from fish tissue and estimation in SDS PAGE.
10. Spectrophotometric estimation of nucleic acids and protein.
11. Polymerase chain reaction for targeted fish gene amplification.
12. Methods of cloning.
13. *In-silico*: data retrieval and data submission tools, construction of phylogenetic tree, primer designing.
14. Visit to advanced laboratory/ institution/ research centre of India.

Recommended Book:

1. Freshwater fishes of the world. Gunther.
2. Fish and fisheries. S. K. Gupta.
3. Limnology. Wetzel.
4. Fish biotechnology. Naik and Rao. Pacific Books International, New Delhi.
5. Textbook of fish genetics and biotechnology. ICAR, New Delhi.
6. Fisheries biotechnology. Lakra, Abidi, Mekherjee and Ayyappan. Narendra Publishing House, Delhi.
7. Fundamentals of environmental biology. Arora.
8. Limnology. Goldman.
9. Biology of fishes. Bone and Moore. Taylore and Francis Group, CRC Press, U.K.
10. The physiology of fishes. Evans and Claiborne. . Taylore and Francis Group, CRC Press, U.K.
11. Physiology of fishes. Brown.
12. Fish physiology-recent advances. Nilsson.
13. Fish and fisheries of India. Jhingran.
14. Fishes of India. C. B. L. Shrivastava.
15. An introduction to fishes. S. S. Khanna.
16. Handbook of fisheries and aquaculture. ICAR, New Delhi

(Open Elective)

PAPER: ZOO1003OP1

GENERAL TOXICOLOGY– II

(Credits: 3+0+1=4)

ZOPEL-PG-402: ADVANCED TOXICOLOGY-II Credit: 3(48L)

Unit 1: Environmental toxicology 12L

1.1 Environmental pollution:

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1. Sources and types of Pollution, important pollution events, 2. Scientific approach to ecotoxicology- entry, movement and fate of pollutants in ecosystems.

1.2 Eco-toxicology of heavy metals:

1. Mechanism of heavy metal toxicity, 2. Case studies of Arsenic, Mercury and Cadmium.

1.3 Environmental persistence of pollutant:

1. Abiotic degradation, Biotic degradation, 2. Non degradative elimination process.

1.4 Sources of toxicants:

1. Sources of toxicants to the environment and transport process

1.5 Bioaccumulation-

1. Definition of Bioaccumulation 2. Factors influence on bioaccumulation.

Unit2: Toxicity of Pesticides and Solvents (10L)

2.1: Pesticides:

1. Definition & Classification of Pesticides 2. Bio-magnification of Pesticides.

2.2: Pesticide toxicity:

1. Introduction to Pesticide toxicity 2. Haematotoxicity: Reproductive and developmental effects, 3. Carcinogenicity, Immunological effects. 4. Environmental problems by organochlorine and organophosphate.

2.3: Principles of Solvent toxicity :

1. Nature of toxic effects, toxicity of Aliphatic solvents –a) Carbon tetra chloride b) Chloroform c) toxicity of alcohols.

2.4: Toxicity of Food Additives-

1. Nature and types of Food Additives 2. Polycyclic hydrocarbons, Hydrocyclic-amines, Nitroso amines and synthetic carcinogens.

Unit3: Occupational and Industrial Toxicology 14L

3.1: Occupational hazards:

1. Concept of Occupational hazards- physical, chemical, biological and mechanical hazards. 2. Occupational diseases: Pneumoconiosis, Silicosis, Asbestosis, Anthracosis. 3. Occupational Cancer – Skin cancer, Lung cancer, Bladder cancer and Leukemia;

3.2: Prevention of Occupational diseases.

1. Risk assessment and management of industrial chemicals, 2. Introduction, Legislation and Regulation.

Unit4: Applied toxicology 12L

4.1 Toxicology of chemical Warfare agents

1. Chemical weapons, classification of chemical warfare agents. 2. Management of warfare agents.

4.2. Veterinary toxicology:

1. Common toxicity in Dog, Cat and Poultry by herbicides, 2. House hold chemicals, heavy metals, mycotoxins etc.

4.3 Wild life toxicology :

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1. Susceptibility of wild life to chemicals, 2. Acute ecological hazards, toxicology of chemicals in birds and mammals, 3. Integrated approach to wild life toxicology.

4.4 Cosmetic toxicology:

1. Toxicity of shampoos, conditioners, bleachers and Dyes, 2. Bioremediation and prevention of occupational diseases.

PRACTICAL: (All experiments involving live animals are for demonstration only) Credit:1

1. Pesticides reduces by TLC techniques.
2. Estimation of Hemoglobin and RBC in Lead exposed experimental animals.
3. Dermal sensitization test.
4. Estimation of Ache activity as a marker of pesticide poisoning.
5. Quantification of DNA damage by SCGE technique (COMET assay).
6. Effect of toxicants on chromosomal aberrations and sister chromatid exchanges.
7. Analysis of pesticide residues in different tissues of fish by TLC technique.

Recomended Books:

1. Principles of ecotoxicology- 3rd edition 2006, C H Walker, S P Hopkin, R N Sibly and D B
2. Peakall (Eds.), Taylor and Francis, NewYork, NY.
3. Introduction to Environmental toxicology -3rd edition 2003, W.G.Landis and M.H.Yu.Lewis publishers, Florida.
4. Text Book of Modern Toxicology 2000 edition, Ernst Hodgson and Patrica Levi, McGraw –Hill International edition. Singapore.
5. Principles of toxicology 2010 edition, Anju Agarwal and Krishna Gopal, ibdc publishersIndia.
6. Essentials of Toxicology 2011 edition, Vijay Kumar Matham, New India Publishing Agency, New Delhi, India.

PAPER: ZOO1004DPW

DPW
(Credit:6)

Paper on Dissertation and Project Work (DPW) – I

The dissertation/project work to be carried out in 4th semester for all the special papers.

1. DPW for Cell and Molecular Biology 6 Credit
2. DPW for Ecology and Wildlife Biology 6 Credit
3. DPW for Entomology 6 Credit
4. DPW for Fish Biology and Fishery Science 6 Credit

Submission of project report and presentation for all special papers and viva voce
