DISCIPLINE SPECIFIC ELECTIVE COURSES

5th SEMESTER

DISCIPLINE SPECIFIC ELECTIVE (DSE)

OPTION -I

ZOO516DA: ANIMAL BIOTECHNOLOGY

CREDITS: THEORY: 4, PRACTICAL: 2

THEORY:

Unit 1

Introduction

1.1 Concept and scope of biotechnology

1.2 Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, and Expression vectors (characteristics)

1.3 Restriction enzymes: Nomenclature, detailed study of Type II.

1.4 Transformation techniques: Calcium chloride method and electroporation.

Unit 2

Gene manipulation

2.1 Construction of genomic and cDNA libraries and screening by colony and plaque hybridization

2.2 Southern, Northern and Western blotting

2.3 DNA sequencing: Sanger method

2.4 Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3

Genetically Modified Organisms

3.1 Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection

3.2 Transgenic animals (mice, cattle, sheep, goat, birds, fishes)

3.3 Applications of transgenic animals

3.4 Production of pharmaceuticals, production of donor organs, knockout mice.

Unit 4

Culture Techniques and Applications

4.1 Preparation of growth media

4.2 Microbial culture techniques and management

4.3 Molecular diagnosis of genetic diseases

4.4 Recombinant DNA in medicine (recombinant insulin and human growth hormone), gene therapy

ANIMAL BIOTECHNOLOGY

PRACTICAL **(Credits 2)**

1. Restriction digestion of plasmid DNA.
2. To study following techniques through photographs
   a) Southern Blotting
   b) Northern Blotting
   c) Western Blotting
   d) DNA Sequencing (Sanger's Method)
   e) PCR
   f) DNA fingerprinting
3. Project report on animal cell culture

SUGGESTED READINGS

- Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis.* II Edition, Academic Press, California, USA.
- Glick, B.R. and Pasternak, J. J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA.* IV Edition, ASM press, Washington, USA.
- Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M. (2009). *An Introduction to Genetic Analysis.* IX Edition. Freeman and Co., N.Y., USA.
- Snustad, D.P. and Simmons, M.J. (2009). *Principles of Genetics.* V Edition, John Wiley and Sons Inc.
- Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). *Recombinant DNA Genesand Genomes- A Short Course.* Ill Edition, Freeman and Co., N.Y., USA.
- Beauchamp, T.l. and Childress, J.F. (2008). *Principles of Biomedical Ethics.* VI Edition, Oxford University Press.

DISCIPLINE SPECIFIC ELECTIVE (DSE)

OPTION-II

ZOO516DB: APPLIED ZOOLOGY

(CREDITS 4)

Unit 1

Host-parasite Relationship and epidomology

1.1 Types of hosts, types of relationships (Parasitism, Symbiosis, Commensalism)
1.2 Zoonosis Transmission, Prevention and control of diseases (Tuberculosis, typhoid)
1.3 Life history and pathogenicity of *Entamoeba histolytica, Plasmodium vivax, Trypanosoma gambiense,*
1.4 *Life history and pathogenisity of Ancylostoma duodenale* and *Wuchereria bancrofti*

Unit 2

2.1 Insects of Economic Importance

Biology, Control and damage caused by *Helicoverpa armigera, Pyrilla perpusilla* and *Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum*

2.2 Insects of Medical Importance

Medical importance and control of *Pediculus humanus corporis, Anopheles, Culex, Aedes Xenopsylla cheopis*

2.2 Insect pests

Of crops, vegetables, oilseeds, coffee, tea

2.4 Insect pest management

Unit 3

Cattle and poultry farming

3.1 Varieties of cattle
3.2 Principles and management of poultry breeding
3.3 Processing and preservation of eggs
3.4 Diseases of poultry

Unit 4

Fish Technology

4.1 Genetic improvements in aquaculture industry, Induced breeding
4.2 Prawn fisheries-culture
4.3 Freshwater fish culture
4.4 Perl and Lac culture

ZOO516DB: APPLIED ZOOLOGY (PRACTICAL: 2 CREDITS)

1. Study of *Plasmodium vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.

2. Study of arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes* and *Xenopsylla.*
3. Study of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying feature and economic importance of *Helicoverpa (Heliothis) armigera, Papilio demoleus, Pyrilla perpusilla, Callosobruchus chinensis, Sitophilus oryzae* and *Tribolium castaneum*
5. Maintenance of freshwater aquarium
6. Visit to poultry farm, animal breeding centre and hatcheries. Submission of visit report

SUGGESTED READINGS

□ Park, K. (2007). *Preventive and Social Medicine.* XVI Edition. B.B Publishers.
□ Arora, D. R and Arora, B. (2001). *Medical Parasitology.* II Edition. CBS Publications and Distributors.
□ Kumar and Corton. *Pathological Basis of Diseases.*
□ Atwal, A.S. (1986). *Agricultural Pests of India and South East Asia,* Kalyani Publishers.
□ Dennis, H. (2009). *Agricultural Entomology.* Timber Press (OR).
□ Hafez, E. S. E. (1962). *Reproduction in Farm Animals.* Lea & Fabiger Publisher
□ Dunham R.A. (2004). *Aquaculture and Fisheries Biotechnology Genetic Approaches.* CABI publications, U.K.
□ Pedigo, L.P. (2002). *Entomology and Pest Management,* Prentice Hall.

DISCIPLINE SPECIFIC ELECTIVES (DSEs)

OPTION-III

ZOO516DC: ZOOLOGY - AQUATIC BIOLOGY

CREDITS: THEORY: 4, PRACTICAL: 2

Unit 1

Freshwater Biology

1.1 Brief introduction to aquatic biomes
1.2 Freshwater ecosystem, estuaries, intertidal zones
1.3 Different stages of stream development, physiochemical environment
1.4 Adaption of hill stream fishes

Unit 2

Freshwater Biology II

2.1 Lakes: Origin and classification
2.2 Lake as an Ecosystem, Lake morphometry,
2.3 Physico-chemical Characteristics
2.4 Nutrient Cycles in Lakes- (Nitrogen, Sulphur and Phosphorous)

Unit 3

Marine Biology

3.1 Oceanic plagic zone and marine benthic zones
3.2 Salinity and density of Sea water, Continental shelf 3.3Adaptations of deep sea organisms
3.4 Coral reefs, Sea weeds.

Unit 4

Management of Aquatic Resources

4.1 Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,
4.2 Eutrophication, Management and conservation (legislations)
4.3 Sewage treatment
4.4 Water quality assessment- BOD and COD.

ZOO516DC: AQUATIC BIOLOGY

PRACTICAL (Credits 2)

1. Determine the area of a lake using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.
3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dom Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.

SUGGESTED READINGS

□ **Anathakrishnan :** Bioresources Ecology 3rd Edition

□ **Goldman : Limnology,** 2nd Edition

Odum and Barrett: Fundamentals of Ecology, 5m Edition

□ Pawlowski: Physicochemical Methods for Water and Wastewater Treatment, 1st Edition

□ Wetzel: Limnology, 3rd edition

□ **Trivedi and Goyal:** Chemical and biological methods for water pollution studies **0**

Welch : Limnology Vols. I-II