

Application of Animal Biotechnology: Production of regulatory proteins (TRF, GRF, Somatostatin, Somatomedin), epidermal growth factors, Anti-coagulants.

Recombinant vaccines: Production of vaccines: DNA vaccines, Monoclonal antibodies, Hybridoma Technology, DNA probes, Biochips, DNA finger printing.

Unit 7: 04
Histological and histochemical techniques: Fixation, embedding, sectioning (microtomy), staining, dehydration, cleaning agents, infiltration, mounting and mountants, Cytological/ histological methods- Enzyme histochemistry, immunohistochemistry

Unit 8: 04
Separation techniques: Chromatography and Gel filtration. Electrophoresis and electro-focusing. Cell fractionation, gradient centrifugation and sub-cellular fractions.

Unit 9: 06
Principles and applications of biochemical methods: RIA, ELISA, DNA sequencing, PCR, GLC, HPLC, Preparation of physiological solutions: Media and Buffers. Nanotechnology and its Application in Biology

References:

1. Chirikjian, J.C. *Biotechnology: Theory and Techniques* Vol. I-II. Jones and Bartlett, 1995
2. Glick, B.R. and Pasternak, J.J. *Molecular Biotechnology: Principles and Applications of Recombinant DNA II* (Ed) A.S.M. Press, 1998.
3. Primrose, S.B. *Molecular Biotechnology- II* (Ed). Panima Publishing Corporation, New Delhi/ Bangalore, 2001.
4. Celis, J.E. (Ed) *Cell Biology: A Laboratory Handbook- Vol. I and II*. Academic Press, 1998.
5. Young, S. S. *Computerized data acquisition & Analysis for life Sciences: A Hands-on guide*. Cambridge University Press, 2001.
6. Robert Brown. *Introduction to instrumental analysis*. McGraw RHill International Editions.
7. Wilson, K & Goulding, K.H. *A Biologists Guide to Principles and Techniques of Practical Biochemistry*. ELBS Ed.

OET-4.6: APPLIED ZOOLOGY

48 hrs

Objective: To teach basic breeding biology of economically important species.

Learning Outcomes: Entrepreneurship, Livelihood, Value addition skills.

- Unit 1:** 02
Introduction: Overview and scope of Applied Zoology, Economically important animals.
- Unit 2:** 10
Sericulture: History of Sericulture. Types of Silk Moths, Rearing methods of Silkworms. Grainage activity, Silk production. Silk worm diseases.
- Unit 3:** 08
Apiculture: Importance of Bee keeping. Different species of Honey bees and their distribution. Management of Bees, Product and byproduct of Apiculture and their uses.
- Unit 4:** 10
Vermiculture: Importance of Vermiculture. Types of earthworms, Life cycle of earthworm, Use of Earthworms for bidegradation of organic waste materials, Techniques of Vermiculture, Harvesting of Vermicompost and Vermimass, Vermicompost as Soil Conditioner and Earthworms as source of Protein. Vermiwash.
- Unit 5:** 08
Aquaculture: Fresh water, Brackish water and Marine fish culture in India, Prawn and Pearl culture, Preservation and Processing of fish; Fish byproducts.

05

Unit 6:
Poultry Science: Introduction, Breeds of fowls, Poultry keeping, Nutritive value of egg and meat, Poultry diseases.

05

Unit 7:
Dairy Technology: Introduction, Breeds of cattle, Breeding and Cattle improvement in India. Nutritive value of Milk and Milk by products.

References:

1. Srivasthava, K.P. *Text Book of Applied Entomology*, Vol. I and II Kalyani Publishers, 1996.
2. Mishra, R.C. *Perspectives in Indian Apiculture*. Allied Scientific Publishers, Bikaner, India, 1999.
3. Lee, K.E. *Earthworms: Their Ecology and Relationship with Soils and Land use* Academic Press. London, 1985.
4. Snathanam, R. Sukumaran, N. and Natarajan, P.: *A Manual of Freshwater Aquaculture*, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1990.
5. Bell, F.W. and Canterbary, E.R. *Aquaculture for Developing Countries- A Feasibility Study*. Cambridge: Ballinger Publishing Co. 1976.

Akkamahadevi Women's University. Vijayapura
 M.Sc. Degree Examination, Nov/ Dec 2018
 Subject: ~~Botany~~ (CBCS) *Zoology*
Theory Model Question Paper

Max. Marks: 70

Time: 3 Hrs

Instructions to the candidates: Answer all the questions; Draw diagrams wherever necessary

Part-A

1X1 = 10

Q-1 Answer the following questions

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Part-B

12X5 = 60

Answer the following any five questions

Q-2

- a)
- b)

Q-3

- a)
- b)

Q-4

- a)
- b)

Q-5

- a)
- b)

Q-6

HCT-3.2: REPRODUCTIVE BIOLOGY AND ENDOCRINOLOGY**48 hrs****Course Objectives :**

The course offers a combination of two related and intermingled studies of reproduction and endocrine control of various physiological actions. It gives vast idea about the reproductive organs, their development and functioning, with keen emphasis on gametogenesis. This course also covers the details of the specific structures pertaining to mammals like placenta and the process of implantation. The course also focusses on study of pre-natal, natal & post-natal processes, with reproductive techniques.

The course also has the advanced study of various endocrine functions including the basic techniques involved in endocrinological studies. It also emphasises on the synthesis, chemical structure and the biological actions of hormones and their receptors on various tissues of the body. It highlights on the classification of hormones and study of growth factors.

Course Learning outcome(CLO): After the study of this course the students will be able to :

- Know the importance of co-ordination between the two studies in the course.
- Explain the anatomy and physiology of reproduction.
- Describe the different Assisted Reproductive Techniques (ARTs) & fertility control methods, that are much required today.
- Know the importance of growth factors & hormones in the current research field.
- Know the comprehensive knowledge of hormones.

Unit 1:**02**

Introduction: Genetic basis of sex determination and differentiation of gonads and gonadal ducts, their hormonal regulation.

Unit 2:**06**

Male reproduction: Anatomy of male reproductive system, Histoarchitecture of Testis, Spermatogenesis; Hormonal control of spermatogenesis; Functional role of androgens.

Male reproductive organs: Epididymis, Vas-deferens, Prostate gland, Seminal vesicle, Coagulating and Cowper's glands. Biochemistry of semen and Biology of spermatozoa.

Unit 3:**06**

Female reproduction: Anatomy of female reproductive system, histoarchitecture of Ovary, Folliculogenesis, Follicular atresia, Ovulation, Luteinisation, and Luteal function. Estrous and Menstrual cycle and its hormonal regulation.

Unit 4:**08**

Implantation: Types of Implantation and hormonal regulation. **Placenta:** Types, Endocrine functions of Placenta.

Gestation: Corpus luteum, Endocrine control of pregnancy in Rat. Metabolic activity during pregnancy.

Parturition: Activation and stimulus of Uterus. Factors involved in Parturition-prostaglandin, Oxytocin, Corticosteroids and other factors.

Lactation: Morphological and functional development of Mammary glands and Milk ejection.

Unit 5:**04****Fertility control:**

Fertility control in male and female: Natural methods, Barrier methods, IUD's, Hormonal contraceptives, surgical methods.

Reproductive techniques: IVF, Embryo transfer, Surrogate Mother, Artificial insemination, Intra-Cytoplasmic Sperm Injection (ICSI).

Unit 6:**02**

Aim and scope of Endocrinology: Techniques in endocrinology; Hormones as biological signals; Classification of hormones

Unit 7:**04**

Structure and Biological actions of hormones of Pituitary, hypothalamus pineal, thyroid, parathyroid, adrenal and pancreas; Neurovascular hypothesis; Endocrine hypothalamus

- Unit 8:** 06
Hormone action: Hormone receptors- types and structure, regulation; Mechanism of hormone action- peptide hormone, receptor signal transduction, G proteins, other membrane messengers, role of protein kinase C; Mechanism of action of steroid hormones; Calmodulin; Termination of hormone action
- Unit 9:** 04
Biosynthesis and secretion of hormones: Steroid hormones, catecholamines, thyroid hormones, peptide hormones- Insulin; Hormonal inactivation
- Unit 10:** 06
Growth factors: Insulin, Prolactin, placental lactogen and IGFs; Neurotrophic growth factors; Hematopoietic growth factors; Epidermal growth factors; Transforming growth factors; Fibroblast growth factors; Cytokines, chalone; Growth factor receptors and cancer

References:

1. Bentely, P. J. Comparative Vertebrate Endocrinology, III Ed. Cambridge University Press, 1998.
2. Degroot, L. J. and Neill, J. D. (Eds). Endocrinology. Vol. I-III. W. B. Saunders Co., 2001.
3. Knobil, E. and Neill, J. D. (Eds). The Physiology of Reproduction. Vol. I and II. Raven Press Ltd. 1994.
4. Mandal, A Hand Book of Neuroendocrinology. EMKAY Publications, 1994.
5. Turner, C. D. and Bangara, J. T. General and Comparative Endocrinology, 1998.
6. Martin, C. R. Endocrine Physiology. Oxford University Press. 7. Saidapur, S. K. (Ed). Reproductive Cycle of Indian Vertebrates. Alloed Publications Ltd., New Delhi, 1989.

SCT-3.3a: ANIMAL BEHAVIOUR

48 hrs

Objective: To teach molecular and physiological aspects of biology and the ecological studies. To study behavior in connection with critical role in biological adaptations.

Learning Outcomes: General awareness on animal communication and helps to live in harmony with other animals.

- Unit 1:** 05
Animal Behavior: Introduction, definition and history (Lorenz, Tinbergen, von Frisch); Questions about animal behavior
- Unit 2:** 08
Development of Behavior: Behavior and genes; Innate behavior; Parent-offspring, Interaction; Imprinting- Filial Imprinting and Sexual imprinting; Instinct- Interaction between instinct and learning; Biological clock; Cultural transmission as a form of behavior and development
- Unit 3:** 10
Learning: Definition and forms: Habituation; Associative learning/ conditioning (Classical conditioning- Pavlov; Operant conditioning, instrumental learning, Skinner), Spatial learning; Insight learning; Social learning; Cognitive maps; Observational learning/imitation; Insight learning; Social learning; Memory – increased synapses, increased neurons; Memory and cognition
- Unit 4:** 09
Communication: Sign and normal stimuli; Channels of communication; Pheromones and acoustic signals; Evolution of display and mimicry, aposematic coloration, deception and honesty; communication in social groups, alarm calls, alarm pheromones, trail pheromones; Dance language in honey bee; Primate language
- Unit 5:** 08
Evolution of Social system: Society, benefits and costs of sociality; Social interactions of groups- Altruism – concept of inclusive fitness, (Kin selection, parental care); Reciprocal Altruism, selfish, spite, conflict and infanticide; Insect eusociality:

HCT- 1.3: CELL AND MOLECULAR BIOLOGY**48 hrs****Course objectives:**

Today's era is the study of living things at the cellular and sub-cellular levels. Without proper approach to these studies the mechanisms and functioning of the cells and organisms at a broader level can't be understood. It is utmost needed to understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles and how these cellular components are used to generate and utilize energy in cells. And the students will be able to apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

Course Learning Outcome(CLO) : After completing the course , Students will be able to :

- Understand and utilize the scientific vocabulary used in communicating information in cell and molecular biology
- Represent and illustrate the structural organization of genes and the control of gene expression
- Conceptualize and describe protein structure, folding and sorting
- Explain the structure of membranes and intracellular compartments and relate these to function.
- Relate how cell movement and cell-cell communication occur and discuss mechanisms of signal transduction
- Outline the processes that control eukaryotic cell cycle and cell death.
- Link the rapid advances in cell and molecular biology to a better understanding of diseases, including cancer.

Unit 1:	04
Introduction: History of cell biology; Levels of cell organization (prokaryotes and eukaryotes), Cell as structural and functional unit of organisms, the scope of modern cell biology.	
Unit 2:	06
Biomembrane: Molecular organization of Bio-membranes, 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 3:	08
Molecular organization and functions of Cell Organelles: Endoplasmic reticulum, Golgi complex, Lysosomes, Ribosomes, Peroxisomes, Mitochondria.	
Molecular organization and functions of cytoskeleton structures: Microfilaments, Microtubules and their role in cell architecture.	
Unit 4:	05
Nucleus: Molecular structure of chromosomes, Euchromatin and Heterochromatin, Role of Histone in packing DNA, Non-histone proteins, Organization and functions of Nucleolus.	
Unit 5:	04
DNA Replication: Unit of replication, enzymes components involved in replication, replication origin and replication fork, fidelity of replication, Prokaryotic and eukaryotic DNA replication mechanism.	
Unit 6:	04
DNA Transcription: Transcription factors and machinery. RNA polymerases. Mechanism of prokaryotic and eukaryotic transcription. Post – transcriptional modifications in RNA: 5'Cap formation, 3'end processing and polyadenylation, Splicing, editing, Nuclear export of mRNA, mRNA stability.	
Unit 7:	06
Translation: Genetic code, Ribosome, Enzymes, factors and the process (formation of initiation complex, initiation factors, elongation and elongation factors, termination, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase), translational proof-reading, translational inhibitors. Co-and post – translational modifications of proteins.	
Unit 8:	06

Cell Cycle: Molecular events during cell cycle, cyclins and cyclin dependent protein kinases (CDK's). Regulation of CDK cyclin activity.

Cell Aging: characteristics and causes of aging; telomeres and aging; **Apoptosis:** Mechanism and significance

Unit 9:

06

Cancer Biology: Characteristics and properties of cancer; Development and causes of cancer, Diagnosis; treatment; Oncogenes, Tumour viruses, Tumor suppressor genes.

References:

1. Alberts, B., Bray Dennis, Lewis Julian, Raff Martin, Roberts K. and Watson J.D. *Molecular biology of Cell*. Garland publishing Inc. New York, 1994.
2. Cellis, J.e. *Cell Biology*. A Laboratory hand book Vol. I and II. Academic Press, 1998.
3. Lodish, H., Berk, A Zipuosky, L.S. Matsudaira, P. Baltimore and Darnell, J. *Molecular Cell Biology* IV Ed. W.H. Freeman and Co., 2001.
4. Malacinski, G.M. and Freifelder D. *Essentials of Molecular Biology* III ed. Jones and Bartlett Publishers, 1998.
5. *Molecular Cell Biology*. Lodish, Harvey; Berk, Arnold; Zipursky, S. Lawrence; Matsudaira, Paul; Baltimore, David; Darnell, James E. New York: W.H. Freeman & Co. 1999
6. *Modern Genetic Analysis*. Griffiths, Anthony J.F. Gelbart, William M, Miller Jeffrey H, Lewontin, Richard C. New York: W.H. Freeman & Co. 1999
7. *Molecular Biology of the Cell*. Alberts, Bruce; Johnson, Alexander; Lewis, Julian, Raff, Martin; Roberts, Keith; Walter, Peter. New York and London: Garland Science 2002
8. *The Cell – A Molecular Approach*. Cooper, Geoffrey M. Sunderland (MA): Sinauer Associates, Inc. 2007
9. *Introduction to Genetic Analysis*. Griffiths, Anthony J.F.; Miller, Jeffrey H.; Suzuki David T.; Lewontin, Richard C, Gelbart, William M. New York: W.H. Freeman & Co. 1999
10. *Principles of Genetics*. Gardner, E.J., Simmon, S. and Snustad, 8th Edition, John Wiley and sons inc. Publication, New York. 1991

SCT-1.4a: BASIC AND APPLIED ENTOMOLOGY

48 hrs

Objectives: To teach basic aspects of arthropod ecology, morphology, parasitology, physiology, systematics and toxicology to applied subjects in apiculture, agricultural, medical and veterinary pest management.

Learning Outcomes: Professional entomologists contribute to the betterment of humankind by detecting the role of insects in the spread of disease and discovering ways of protecting food and crops, and livestock from being damaged. The way beneficial insects contribute to the well-being of humans, animals, and plants.

Unit 1:

03

Insect Taxonomy: Classification of insects up to orders with suitable examples; Morphology of integument, head, thorax and abdomen and appendages.

Unit 2:

10

- a. **Structure and function:** Digestive system, respiratory system, excretory system.
- b. **Nervous system:** Sense organs, sound producing organs, photoreceptor and photogenic organs
- c. **Endocrine system:** Hormones and their regulation
- d. **Reproductive system:** Reproductive system, metamorphosis and diapauses in insects

Unit 3:

10

- Insect pests:**
- a. Definition, categories, origin of pest, causes for outbreak, economic damage.
 - b. **Pest monitoring:** Pest surveillance, forecasting survey and sampling techniques, crop loss estimation.
 - c. **Insect pests of major crops:** Damage, life cycle, seasonal history, status and control of major pests of important crops such as Cereals: Rice, Sorghum, Maize, Wheat; Oil seeds: Sun flower, Saff flower

& Groundnut; Vegetable crops: Brinjal, Ladies finger, Cabbage and Beans; Commercial crops: Sugarcane, cotton, Coconut and Coffee.

Unit 4:**10**

Integrated Pest Management: History, different phases of pest control, (Quarantine, Physical, Chemical, Biological control and, genetic and biotechnological methods) control. Pheromones- Types, chemical characteristics, biosynthesis and their use in pest management, Pheromone traps.

Unit 5:**05****Medical Entomology:**

Common insects attacking humans and domestic animals; their life history, mode of attack, type of injury or infection, treatment and control with reference to House fly, Blow flies, Blood sucking insects.

Unit 6:**10****Culture of commercial Insects:**

- Honey bee: Species, role in pollination, bee keeping and management, bee products.
- Silk worm: species, silkworm rearing and management, pests of silkworm
- Lac Insect: Host plants, Lac cultivation, commercial importance.

References:

- Awasti V.B. 2009 Introduction to general entomology 3rd Ed. Scientific publication (India), Jodhpur
- Awasti V.B. 2007, Agricultural Insect Pests and their control. Scientific publishers (India) Jodhpur
- Trigunayat M.M. 2009, A Manual of practical entomology, scientific publishers, Jodhpur, India.
- Dhaliwal G.S. Ramsingh and B.S. Chillar 2006, Essentials of Agricultural entomology. Kalyani Publishers, New Delhi.
- L. K Jha. Applied Agricultural Entomology. New central book agency. Calcutta
- Rajendra singh. 2007. Elements of Entomology. Published by Rakesh kumar. Rastogi and Rastogi Publications. Gangotri, Shivaji Road. Meerut.

SCT-1.4 b: BIODIVERSITY**48 hrs**

Objective: Diversity of life on earth is an essential factor for the healthy functioning of ecosystems. The aim to study biodiversity is to protect, preserve and manage natural resources.

Learning Outcomes: Biodiversity is also considered to have intrinsic value, economic, ecological life support, recreation, cultural and scientific sustenance.

Unit 1:**03**

Introduction: Concepts, Definition, Values of diversity, Consumptive use and productive use, Social and Aesthetic values.

Unit 2:**09**

Genetic diversity: Genetic diversity, Species diversity, Ecosystem diversity, Biodiversity at global, National and local levels.

Hot spots of Biodiversity: Biodiversity hot spots in India, India as a mega diversity country, Endemic species.

Unit 3:**06**

Concept of biodiversity: Types of biodiversity and biodiversity profile of India. Ramsar wetlands. General theories of biodiversity: biotic and abiotic theories.

Unit 4:

12

- a. **Threats to Biodiversity:** Deforestation, Habitat destruction, Hunting, and over exploitation, introduction of exotic species, Impact of Pollution on biodiversity.
- b. **Wild life status; Endangered, vulnerable, Rare and threatened species**
- c. **Conservation of biodiversity:** Objectives, In-situ and Ex-situ conservation, People movement, Role of Educational Institutes and NGO's Biodiversity awareness, programme, Future strategies for biodiversity conservation in India.

Unit 5:

12

- a. **Biodiversity Legislation:** Legal aspects with respect to India, Biodiversity Act, 2002; CBD; CITES, IPR.
- b. **Biodiversity and Biotechnology:** Assessment of biodiversity and bioresources, biodiversity conservation, utilization of biodiversity, GMO's and their impact on biodiversity.

Unit 6:

06

Biodiversity and Management:

- a. Organizations associated with biodiversity Management, IUCN, UNEP, UNESCO, WWF, FAD, WCWC, BMC, KBB and BHS; their role and contributions
- b. Bioprospecting, Biopiracy, Biosafety, Bioremediation.

References:

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.
4. Singh, M.P. 2009. Biodiversity. APH Publishing Corporation, New Delhi.
5. Saharia, V.B. 1982. Wildlife in India. Natraj Publishers, Dehara Dun.
6. Kotwal, P.C. and Banerjee, S. 2004. Biodiversity Conservation in managed forests and protected areas. Agrobios (India) Publishers, Jodhpur.
7. NBA. 2004. The Biological Diversity Act (2002) and Biological Diversity Rules (2004). NBA, Chennai, India.
8. Kumar, U. and Asija, M. 2005. Biodiversity: Principles and Conservation. 2nd Edn. Agrobios (India) Publishers, Jodhpur.
9. B. B. Hosetti 2005. Glimpses of biodiversity, Daya Publishers. Delhi-11
10. B.B.Hosetti and M.Venkateshwarlu 2004. Trends in wildlife biodiversity, conservation and management. Vol. I and II Daya Publishers, Delhi-11.
11. B.B. Hosetti 2008. Concepts in wildlife management, III edition, Daya Publishers, Delhi.

SCT-1.4 c: VECTORS AND COMMUNICABLE DISEASES.

48 hrs.

Objectives: To learn biology of vectors and their respective diseases, epidemics, pandemics, prevention, and control measures.

Outcomes: Basic scientific awareness and identification of vectors and their clinical applications.

Unit 1: Introduction to vector borne diseases and vectors- World scenario; Indian scenario. Historical perspective- Epidemics, discoveries; Scientists and major events involved in the discovery of vectors and pathogens of communicable diseases

08

Unit 2: Epidemiology, biology of vectors and pathogens, transmission cycles and symptoms- of malaria, filariasis, yellow fever, leishmaniasis and anthrax.

08

Unit 3: Epidemiology, biology of vectors and pathogens, transmission cycles and symptoms- of dengue, chikungunya, Japanese encephalitis, schistosomiasis and plague. 08

Unit 4: Distribution, epidemiology and control of Yellow fever, African sleeping sickness, oncocerciasis and chagas disease. 08

Unit 5: Mechanical vectors- House flies, cockroaches and bedbugs- Transmission of dysentery, diarrhea, typhoid, cholera, epidemic conjunctivitis and skin infections. 08

Unit 6: Control of vector borne diseases; Vector control- Chemical, Biological, Genetic and Environmental. Insecticide resistance in vectors. Drug resistance in pathogens. Importance of education, awareness and Community participation. 08

References:

1. Clements, A. N., 1992. The biology of Mosquitoes, Vol-I, Chapman and Hall, London.
2. Clements, A. N., 1999. The biology of Mosquitoes, Vol-II, Chapman and Hall, London.
3. Fenemore, P. G. and Alka Prakash., 1992. Applied Entomology, Wiley Eastern Ltd., New Delhi.
4. Gullan, P. J. and Cranston. 1994. The Insects: An outline of Entomology, Chapman and Hall, London.
5. Kenneth, G. V. Smith, 1973. Insects and other arthropods of medical importance. Trustees of British Museum, London.
6. Manson- Bahr, P. E. C. and Bell, D. R., (Ed) 1987. Manson's tropical diseases. English Language Book Society, Barillien Tindall.
7. Metcalf, R. L. and W. B. Flint. 1962. Destructive and useful insects, their habits and control. McGraw Hill Publ. Co., N. Y.
8. Rao, T. R., 1984. The Anophelines of India. Publ. by Malaria Research Centre, Delhi.
9. Service, M. W., 1976. Mosquito ecology. Applied Science Publication Ltd., London.
10. Srivastava, K. P., 1988. A Textbook of Applied Entomology, Publ. Kalyani Publishers, New Delhi.
11. WHO (Geneva), 1989. Geographical distribution of arthropod borne diseases and their principal vectors. WHO. Geneva.

OET-1.8. Offered by the Department of Women's Studies.

SCT-2.4a: ECONOMIC ZOOLOGY**48 hrs****Objective:** To teach basic breeding biology of economically important species.**Learning Outcomes:** Entrepreneurship, Livelihood, Value addition skills.**Unit 1:****02****Introduction:** Overview and scope of Applied Zoology, Economically important animals.**Unit 2:****08****Sericulture:** Brief History and Development of Sericulture. Types of Silk Moths, Rearing methods of Silkworms. Grainage activity, Silk production. Silkworm diseases.**Unit 3:****08****Apiculture:** Importance, History and Development of Bee keeping. Different species of honey bees and their distribution. Management of beekeeping. Product and byproduct of Apiculture and their uses.**Unit 4:****08****Vermiculture:** Importance of Vermiculture. Types of earthworms, Life cycle of earthworm, Use of Earthworms for biodegradation of organic waste materials, Techniques of Vermiculture, Harvesting of Vermicompost and Vermimass, Vermicompost as Soil Conditioner and Earthworms as source of Protein. Vermi-wash.**Unit 5:****09****Aquaculture:** Freshwater, brackish water and Marine fish culture in India, Prawn and Pearl culture, Preservation and processing of fish; Fish byproducts.**Unit 6:****04****Poultry Science:** Introduction, Breeds of fowls, Poultry rearing (Broiler and layer farming), Nutritive value of egg and meat, Poultry diseases.**Unit 7:****05****Dairy Technology:** Introduction, Breeds of cattle, Breeding and Cattle improvement in India. Nutritive value of Milk and Milk by products.**Unit 8:****04****Lac culture:** Lac insect, strains of Lac insects, host plants Cultivation, lac culture, composition of Lac, processing of Lac and its uses.**References:**

1. Srivasthava, K.P. *Text Book of Applied Entomology*, Vol. I and II Kalyani Publishers, 1996.
2. Mishra, R.C. *Perspectives in Indian Apiculture*. Allied Scientific Publishers, Bikaner, India, 1999.
3. Lee, K.E. *Earthworms: Their Ecology and Relationship with Soils and Land use* Academic Press. London, 1985.
4. Snathanam, R. Sukumaran, N. and Natarajan, P.: *A Manual of Freshwater Aquaculture*, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1990.
5. Bell, F.W. and Canterbury, E.R. *Aquaculture for Developing Countries- A Feasibility Study*. Cambridge: Ballinger Publishing Co. 1976.

SCT-3.3b: MICROBIOLOGY**48 hrs**

Objectives: To learn a fundamental understanding microbes and their biology. Microbial economics and industrial applications.

Outcomes: Generates skilled human resources to address disease and epidemics. Research and development in science and technology.

Unit 1:

Introduction: History of Microbiology, biodiversity, distribution, general classification and distinguishing features of various groups of microorganisms. **08**

Unit 2:

Isolation and culture of microorganisms: Principle and technique of isolation; microbial nutrition (types of microbial culture and microbial media), microbial growth, enumeration of microbes and microbial biomass **10**

Unit 3:

Sterilization techniques: Physical methods (Dry and wet), Radiation (ionizing and non ionizing), Filtration (porcelain, sintered glass and membrane filters), Chemical methods (Asepsis, disinfection); phenol alcohols: halogens and phenol coefficient). **10**

Unit 4:

Viruses: Structure and classification, replication, bacteriophages, life cycle of phage typing, Viroids and prions. **05**

Unit 5:

Mycoplasma: Chlamydiae, Rickettsia, their Properties, classification and their role in animal and human diseases. **05**

Unit 6:

Yeast: Structure, classification, culture and economic importance. **04**

Unit 7:

Industrial microbiology: Importance of bacteria and Yeasts; production of alcohol, microbial pesticides, microbial antibiotics and microbial enzymes **06**

References:

1. Alexander N. Glazer, Hiroshi Nikaido 1998. Microbial biotechnology. Fundamentals of Applied biotechnology, W.H. Freeman and Company, NY.
2. Edward. 1996, Fundamentals of microbiology, 4th edition. The Benjamin/Cumming Publication Corp.
3. Lancing M. Prescott, John P. Harley and Donald A. Klein. 2002. Microbiology. 5th edition. McGraw Hill publication. New Delhi.

SCT-3.3C: TOXICOLOGY

48 hrs

Objectives: To learn about basic toxicological science. Methods to determine the adverse effect of xenobiotics on living forms and environment.

Outcomes: Qualified human resources to interpret and communicate the nature of toxicological impacts. Basic preventive and control measures of toxicants. Entrepreneurship, R&D.

- Unit 1:** Scope and concept, Basic principles of toxicology 02
- Unit 2:** Principles of bioassay, Dose-response, LC, LD, LT values, EC, ED and ET values, lethal dose, sub-lethal dose. Introduction, Definition of toxicology 08
- Unit 3:** Bio concentration, Biotransformation, Bioaccumulation, Biomagnification, Biomassformation of organophosphates and organochlorines 08
- Unit 4:** Biomonitoring of toxic chemicals 08
- Unit 5:** Heavy metals toxicity, cosmetic toxicity, animal toxin, mycotoxin, plant toxin, biotoxin and their disease 08
- Unit 6:** Smoking aids: Active and Passive smoking, Consumption of tobacco, Marijuana (Ganja), their effects and Prevention measures. 03
- Unit 7:** Risk assessment: Exposure assessment, Dose-Dosage, Risk characterization, Risk analysis and communications, Occupational health and illness. 03
- Unit 8:** Pesticides: Classification of pesticides, Sources and their effects to human, toxicity of Pesticides- viz. Hematotoxicity, Nephrotoxicity, Neurotoxicity, Immunotoxicity and Biopesticides. 08

Reference:

- Gorge W. Warne, 1988. Reviews of Environmental contamination of Toxicology, Springer-verlag, New York.
- Subramanian, M.A. 2004. Toxicology Principles and methods MJP Publishers Chennai.
- Philip, L. Williams, Robert C. Jawes, Stephen M. Roberts, 2000. Principles of Toxicology, II Ed. A Wiley science publication John Wiley & Sons. INC. New York.
- Pandey, K. and J.P. Shukla, 1990. Elements of Toxicology. Radha publ. New Delhi.
- Bohmont, B.L., 1999. The standard Pesticide user's guide. Prentice hall, PRT, New York.
- Hassall, K.A. 1990. The Biochemistry and uses Pesticides structure, metabolism and Mode of action and as in crop protection, John Wiley & Sons. Inc.
- Hornshy, A.G., Herner, A.E., and Don Wauchope, R. 1995. Pesticide properties in Environment. Springer-verlag, New York.
- Carmin, M.A., 1997. Pesticide Profiles: Toxicity, Environmental Impacts and Fate. CRC press Ohio, A.

HCT-4.2: PROJECT WORK AND SUBMISSION OF DISSERTATION

HCT- 4.3: APPLIED ANIMAL BIOTECHNOLOGY

48 hrs

Course Objective :

This is a practical based course focussing on providing students with a theoretical, practical and applied understanding of animal biotechnology. The course covers cell & tissue cultures, animal molecular biology, recombinant DNA technology, production of transgenic animals, reproductive biotechnology, animal cloning, recombinant vaccines ,histochemical techniques and ethics. The course also emphasises in detail about the biophysical, biochemical and separation techniques that are currently the basics of any molecular biology lab and research work.

Course Learning Outcomes(CLO): After learning the course the student will be :

- Able to handle and culture animal cells & tissues in the laboratory conditions.
- Able to take up a job as embryologist in the Infertility centres.
- Aware about the animal cloning & its ethical concerns and patenting.
- Able to take up the knowledge of biochemical, biophysical and separation techniques in research and development of animal sciences.

Able to describe advancement in vaccination and DNA derived products for therapeutics.

Unit 1: 02

Introduction: Concept and Scope of Biotechnology, Current Status and Future

Unit 2: 06

Animal Cell and Tissue Culture: Definition, Principles of cell and tissue culture; cell lines. Requirement: Equipments, Culture media, Application of cell culture.

Stem Cell Technology: Definition, types and properties of stem cells, Differentiation of stem cells, Advantages and Disadvantages of Stem cell technology.

Unit 3: 06

Gene Cloning and Gene Transfer Techniques: Somatic cell nuclear transfer; Recombinant DNA Technology- Molecular tools, Cloning vectors: Gene transfer methods- Microinjection, Electroporation, Polycations, Lipofection, Retroviral infection.

Unit 4: 06

Invitro-fertilization, Embryo transfer and cloning in Mammals: Procedure and limitations of IVF, Embryo Transfer Technique, Cloning of different Mammals.

Unit 5: 06

Trangenic animals and Gene Therapy: Production of transgenic animals, Gene targeting, Knock-out and Knock-in Technology. Transgenic animals- Ethical concerns and Patenting. Gene therapy: Somatic versus- germ line therapy, Gene therapy in animals.

Unit 6: 08