3. Atwal, A.S. (1993) Agricultural Pests of India and South East Asia. Kalyani Publishers, NewDelhi.
4. Dennis, S. Hill. (2005) Agricultural Insect Pests of the Tropics and Their Management, Cambridge University Press

Suggestive readings

1. David, B.V. and Ananthakrishnan, T.N. (2004) General and Applied Entomology. Tata-McGraw Hill, New Delhi.
2. Duntson, P.A. (2004) The insects: Structure, Function and Biodiversity. Kalyani Publishers, New Delhi.
3. Wigglesworth, V.B. (1984) Insect Physiology. VIII Edition, Chapman & Hall, NewYork.

E contents:

https://swayam.gov/appliedentomology.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

GENERIC ELECTIVE – 4:

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Animal Cell Culture techniques ALS ZOO GE 04	**4**	**2**	**0**	**2**	Class XII pass with Biology and Chemistry	NA

Learning Objectives:

The learning objectives of this course are as follows:

- The aim of this course is to give knowledge about cell and tissue culture technology.
- The course will provide training to set up a tissue culture lab.

Learning Outcomes:

By studying this course, students will be able to:

- acquire the expertise to set up animal cell culture laboratory.
- learn about the maintenance and manipulation of animal cells *in vitro*.

Unit 1 (4 Hours)

Introduction to animal cell culture; Historical background, Biology of animal cell and cell-cell interactions, good laboratory practices, Sterilization methods and techniques.

Unit 2 (8 Hours)

Equipment: Laminar-Flow Hood, Autoclave, Inverted Microscope, Centrifuge, Haemocytometer, Humidified CO_2 incubator, Cryostorage Container.

Media and Buffers: Types of culture media, Physicochemical characteristics of medium - pH, O_2 CO_2 and Bicarbonate buffering, Osmolality, Temperature, Viscosity and Surface Tension. Importance of Serum and Serum-free media, Balanced salt solutions, Antibiotics and other supplements.

Unit 3 (10 Hours)

Tissue Culture: Primary Cell Culture- Isolation of the tissue, Initiation of culture: Types of primary culture. Subculture and cell lines; culture of tumor cells, principles of cryopreservation of cell lines. *in vitro* transfection of animal cells-chemical method, lipid mediated gene transfer (lipofection), Electroporation. Microbial contaminants (Bacteria, Yeast, Fungi, Mycoplasma and Virus) in cell line.

Unit 4 (8 Hours)

Applications of Animal Cell Culture**:** Toxicology studies, Vaccine production, Gene therapy, Stem cell therapy, Production of recombinant proteins, Cancer Research.

PRACTICAL (60 hours)

1. Packing and sterilization of glassware and plastic ware for cell culture.
2. Study of different sterilization techniques used in cell culture laboratory.
3. Preparation and sterilization of culture medium, buffers and solutions.
4. Sub-culturing of cell lines.

5. Counting of cells in given cell line sample using hemocytometer.
6. To study about cytotoxicity and cell viability.
7. Demonstration of transfection in cell lines using Photographs/Videos.
8. Demonstration of working of the following instruments:
   i) Laminar Flow Hood ii) Autoclave iii) Humidified CO_2 Incubator iv) pH Meter.
9. Project report on visit to animal cell culture labs

Essential/recommended readings

1. Freshney, R. IAN. (2021). *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications* (8th Ed.).
2. Masters, John. R. W. (2000). *Animal Cell Culture: A Practical Approach* (3rd Ed.).
3. Butler, M. (2003). *Animal Cell Culture and Technology.* (2nd Ed.).

Suggestive readings

4. Davis, John. M. (2011). *Animal Cell Culture: Essential Methods*.
5. Bhatt, Sheelendra. M. (2011). *Animal Cell Culture: Concept and Application.*

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

GENERIC ELECTIVE – 5:

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Locust and its management ALS ZOO GE 05	**4**	**2**	**0**	**2**	Class XII pass with Biology and Chemistry	NA