GENERIC ELECTIVE – 6:

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		
Beneficial Insects and their products ALS ZOO GE 06	**4**	**2**	**0**	**2**	Class XII pass with Biology and Chemistry	NA

Learning Objectives:

The learning objectives of this course are as follows:

- The course will highlight the significance of beneficial insects.
- It will give knowledge about various products of insect origin and their uses.
- The course will help in developing entrepreneur skills required for self-employment.

Learning Outcomes:

By studying this course, students will be able to:

- attain knowledge of beneficial insects and their products.
- develop an understanding of the biology of beneficial insects, their interactions with each other and with the environment.

Unit 1. Introduction (5 Hours)

An introduction to the beneficial insects and their applications in agriculture - (Pollination and dispersal; decomposition - dung, carrion and plant materials), in medicine, in veterinary and in forensic entomology. Bioagents: Insectsas natural enemies of pests and as scavengers.

Unit 2. Honey and Wax (7 Hours)

Introduction and history of bee-keeping; Honey bees: species type, morphology, biology, conservation, seasonal management, hives, diseases; Honey and wax production and their uses, Ripening of honey, Propolis.

Unit 3. Silk (7 Hours)

History and development of silkworms in India, different species, voltinism and biology of silkworm, main and alternate host plants, method of harvesting and preservation of mulberry leaves, types of silk, silk production.

Unit 4. Lac (6 Hours)

Species of lac insects, morphology, biology, host plants, Lac production and its uses, Types of lac; seed lac, button lac, shellac, and lac-products.

Unit 5. Dyes (5 Hours)

Insect derived - Cochineal dye: *Dactylopius coccus*; Polish cochineal dye: *Porphyrophora polonica*; Carmine dye: *Kermes varmilo* and other insects.

Insect induced plant products: Tannic acid.

Other products: Honeydew.

PRACTICAL (60 hours)

1. Study of different species of honeybees(mouthparts, legs of worker, stinging apparatus) through specimens/photographs/slides.
2. Study of adult lac insect through photographs and slides.
3. Study of different species of silk moth (mouthparts and legs)
4. Study of biocontrol agents/natural enemies of insect pests through photographs/slides. .
6. To study the adulterations/purity of honey/shellac/silk.
7. Visit to research and training Institutions/Unit of Beekeeping, Sericulture, Lac culture.

Essential/recommended readings

1. David, V. Alford. (2019). *Beneficial insects*. CRC Press, taylor and francis, vocaraton, Florida.
2. Sathe, T. V., and Jadhav, A. (2002). *Sericulture and Pest Management.* Daya Publishing House.

Suggestive readings

1.Yonemura, M., and Rama Rao, N. (1951). *A Handbook of Sericulture. I. Rearing of silk-worms*. Government Branch Press, Mysore.

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