

P.G DIPLOMA IN SERICULTURE

Semester-Wise

(w.e.f the academic year 2021 - 2022)

FOR THE UNIVERSITY COLLEGE



**SERICULTURE UNIT
ZOOLOGY DEPARTMENT
KAKATIYA UNIVERSITY
WARANGAL - 506009**

Dr. K. SUJATHA
Chairperson, BOS in Sericulture,
Sericulture Unit, Department of Zoology,
Warangal, Kakatiya University
(Accredited by NAAC with 'A' Grade)



Telangana-506 009, T. S., India
Email: k.sujatha8900@gmail.com
Mobile: 9849296672

Date:

Lr. No. /A/BOS/Zoo/Seri/UC/KU/2021

To,
The Registrar,
University College,
Kakatiya University,
Warangal.

Sub: Approval – revised syllabus of PD diploma in Sericulture PGDS – Syllabi of open elective and foundation course papers – submission req. reg.

With the subject cited above I am herewith enclosing the approved revised syllabus (semester pattern) along with the distribution of marks and credits of PG diploma in sericulture (PGDS) being offered in University college campus, Kakatiya University under Choice Based Credit System (CBCS) with effect from 2021 – 2022 academic year. The approved revised syllabi are being enclosed.

Hence, kindly accept and acknowledge with necessary approval from the appropriate body for the implementation from the current academic year (2021 -2022).

Thanking you,

Yours faithfully,

Chairperson,
BOS in sericulture

Enclosures:

1. Approved syllabi of semester pattern of PGDS in Sericulture.
2. Approved syllabi, distribution of marks and credits for open elective and foundation course

Copy to

1. The Coordinator, IQAC, KU, Warangal.
2. The Principal, University College, KU, Warangal
3. Head, Dept of Zoology, Ku, Warangal

MINUTES OF THE MEETING

Revised syllabus for PDGS sericulture course (CBCS & CAGP)

Proceedings

The chairman and members of Board of Studies, Sericulture – Kakatiya University met on 16-11-2021 at 11.00 AM in the chamber of Head, Dept of Zoology with following members

- | | |
|---|-------------|
| 1) Dr. K. Sujatha,
Asst Prof of Sericulture, KU | Chairperson |
| 2) Dr. M. Estari,
Incharge, Sericulture Unit, KU | Member |
| 3) Dr. Kaneez Fatima,
Asst Prof of Sericulture, KU | Member |

Chairperson BOS in sericulture welcomed the members to the meeting and presented the following agenda.

1. Approval of newly constructed syllabus as per revised CBCS regulations

- A) The Board of Studies in Sericulture (PGDS) at its meeting held on 16th November, 2021 recommended the distribution of credit pattern with modified syllabus under CBCS and CAGP regulations to be considered for the implementation from the current academic year 2021-2022 for PGDS.
- B) Introduction of one foundation course and open elective along with project work experience has been finalized and approved.
- C) The scheme of examination, curriculum and allocation of marks for each paper were finalized and approved by the members.

The approved syllabus of the above mentioned course is enclosed herewith for circulation to the dept and university website.

Chairperson BOS

External Member

Head, Member

External Member

Member

Distribution of Marks and Credits

Paper	Max. Marks	No. of Credits
Theory (2 Semesters)	$2 \times 4 \times 100 = 800$	$2 \times 4 \times 4 = 32$
Practical (2 Semesters)	$2 \times 3 \times 100 = 600$	$2 \times 3 \times 4 = 24$
Foundation Course (I Semester)	$1 \times 1 \times 50 = 50$	$1 \times 1 \times 2 = 02$
Open Elective (II Semester)	$1 \times 1 \times 100 = 100$	$1 \times 1 \times 4 = 04$
Seminar (I Semester) and Project Work Experience (II Semester)	$2 \times 1 \times 25 = 50$	$2 \times 1 \times 1 = 02$
Total	1600	64

Chairperson,
BOS in Sericulture

**Revised CBCS pattern in Semester System of P.G. Diploma in Sericulture (PGDS)
at University College Campus (w.e.f 2021 – 2022 academic year)**

1-Semester (w.e.f 2021 – 2022 academic year)

Paper code	Title of the paper	Internal exam marks	End Exam		Total max marks	Total min marks	No. of credits
			Max marks	Min marks			
THEORY							
101	Silk industry and overview	20	80	32	100	40	04
102	Mulberry production	20	80	32	100	40	04
103	Silkworm biology and physiology	20	80	32	100	40	04
104	Mulberry & Silkworm crop protection	20	80	32	100	40	04
105	Foundation Course	10	40	16	50	20	02
PRACTICALS							
106	Mulberry production - I	-	100	40	100	40	04
107	Silkworm biology & physiology – II	-	100	40	100	40	04
108	Mulberry & Silkworm crop protection- III	-	100	40	100	40	04
	Seminar	-	25	10	25	10	01
	Total				775		31

II-Semester (w.e.f 2021 – 2022 academic year)

Paper code	Title of the paper	Internal exam marks	End Exam		Total max marks	Total min marks	No. of credits
			Max marks	Min marks			
THEORY							
201	Silkworm rearing technology	20	80	32	100	40	04
202	Silkworm seed production	20	80	32	100	40	04
203	Post cocoon production	20	80	32	100	40	04
204	Sericulture extension	20	80	32	100	40	04
205	Open elective	20	80	32	100	40	04
PRACTICALS							
206	Silkworm rearing technology – IV	-	100	40	100	40	04
207	Silkworm seed production - V	-	100	40	100	40	04
208	Post cocoon production	-	100	40	100	40	04
	Project Work Experience	-	25	10	25	10	01
	Total				825		33

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER – I
PAPER – I

SERI 101: SILK INDUSTRY – AN OVERVIEW – THEORY

UNIT – 1: Global Textile and Silk Scenario

- 1.1 Silk producing organisms and types of natural and synthetic fibers.
- 1.2 Origin and history of sericulture, silk road
- 1.3 Prospects and problems of sericulture industry
- 1.4 International sericulture commission, Central silk board and its functions.

UNIT – 2: Entrepreneurial opportunities in sericulture

- 2.1. EDP – objectives of EDP, qualities of entrepreneur, selection of potential entrepreneur.
- 2.2. EDP in sericulture – Sapling production, establishment of chawki and late age rearing centers, grainages and reeling industry
- 2.3. Recycling of sericulture by products and sericraft preparation
- 2.4. Women as entrepreneur in Sericulture

UNIT – 3: Value addition and economic viability

- 3.1. Value addition from moriculture and rearing
- 3.2. Value addition from reeling and grainage
- 3.3. Employment generation for youth and women through sericulture
- 3.4. Income generation in rural areas through sericulture & cost benefit ratios in sericulture

UNIT – 4: Marketing and development strategies

- 4.1. Pricing and fixation of prices
- 4.2. Cocoon markets and price stability
- 4.3. Future strategies for sericulture
- 4.4. Marketing of sericulture appliances, machines and chemicals

Reference Books

Dhote, A. K. (1989) **Sericulture Extension and Management**. *National Council of Educational Research and Training, New Delhi.*

Ganga, G. and Sulochana Chetty, J. (1995) **An introduction to Sericulture** (3rd *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Hisao Aruga (1994) **Principles of Sericulture**. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Rajat K. Datta and Mahesh Nanavaty (2005) **Global Silk Industry: A complete Source Book**. *Universal Publishers, Boca Raton, Florida, USA.*

Sandhya Rani S (1998) **Sericulture and Rural Development**. *Discovery Publishing House, New Delhi.*

Sanjay Sinha (1990) **The Development of Indian Silk: A wealth of Opportunities**. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER – I
PAPER – II

SERI 102: MULBERRY PRODUCTION - THEORY

UNIT – 1: Mulberry and its botanical aspects

- 1.1 History – Origin and geographical distribution of mulberry
- 1.2 Mulberry species and varieties cultivated in India and other countries
- 1.3 Morphology – Root, stem, leaf, flower, fruit and seed
- 1.4 Anatomy – Root, stem, leaf, flower, fruit and seed.

UNIT – 2: Mulberry production

- 2.1. Types of reproduction – Sexual and asexual methods
- 2.2. Nurseries – their importance, raising and maintenance of nurseries
- 2.3. Climatic factors and its influence on growth and productivity of mulberry
- 2.4. Genetic improvement through selection and hybridization

UNIT – 3: Mulberry plantation, establishment and maintenance of Mulberry garden

- 3.1. Soil and its types, texture, porosity, organic matter, macro and micro nutrients and their deficiency symptoms.
- 3.2. Preparation of land and planting system
- 3.3. Mulberry cultivation in rain fed and irrigated conditions, chawki gardens for CRC
- 3.4. Estimation of leaf yield

UNIT – 4: Package of practices for Mulberry cultivation

- 4.1. Water – definition, types and its management
- 4.2. Nutrient – manures, chemical fertilizers and bio fertilizers and their dosages
- 4.3. Weeds and its management, pruning, harvesting, transportation and storage of mulberry leaves:- objectives and methods.
- 4.4. Mulberry farming and its management, types of arms, types of farm records, problems faced while maintaining farm records and labor management.

Seri 106 PRACTICALS – Paper 1

1. Taxonomy of mulberry with reference to various species and varieties grown in India and their identification.
2. Morphology of mulberry plant with reference to various vegetative and floral parts.
3. Anatomy of stem, root, leaf, petiole and bud including leaf epidermis (Stomata and hairs). Section cuttings & preparation of permanent slide.
4. Reproduction biology: flower structure, embryology, pollen sterility/viability.
5. Hybridization techniques of mulberry.
6. Raising of mulberry nursery
7. Propagation methods with reference to cuttings, grafts and layers.
8. Identification of mulberry weeds
9. Identification and use of implements required for mulberry cultivation.
10. Fertilizer requirement- Dose calculation and methods of application.
11. Collection of soil samples.
12. Testing of soil samples- pH, soil horizon, bulk density, water hold capacity, permanent within co-efficient organic matter capacity and NPK.
13. Pruning methods followed in India.
14. Harvesting methods, Estimation of leaf production, Farm records and their maintenance, Identification of manures and fertilizers, dosage application and calculation for given area of plantation.

Reference Books

Afifa S. Kamili and Amin Masoodi, M. (2000) **Principles of Temperate Sericulture**. *Kalyani Publishers, Ludhiana*.

Dandin, S. B. and Giridhar, K. (2010) **Handbook of Sericulture Technologies (4th revised Edition)**. *Central Silk Board, Bangalore*.

Ganga, G (2003) **Comprehensive Sericulture, Volume 1: Moriculture**. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi*.

Ganga, G. and Sulochana Chetty, J. (1995) **An introduction to Sericulture (3rd Reprint)** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi*.

Hisao Aruga (1994) **Principles of Sericulture**. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi*.

Rangaswamy, G., Narasimhanna, M. N., Kasiviswanathan, K., Sastry, C. R. and Jolly, M.S. (1976) **Sericulture Manual 1- Mulberry Cultivation**. *Food and Agricultural services Bulletin 15/1. Food and Agriculture Organization of the United Nations, Rome*.

Rajanna, L., Das, P. K., Ravindran, S., Bhogeshha, K., Mishra, R. K., Singhvi, N. R., Katiyar, R. S. and Jayaram, H. (2005) **A Textbook on Mulberry Cultivation and Physiology**. *Central Silk Board, Bangalore*.

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER – I
PAPER – III

SERI 103: SILKWORM BIOLOGY AND PHYSIOLOGY - THEORY

UNIT – 1: Classification and biology of silkworm

- 1.1 Serigenous insects - Salient features of class insecta – classification of serigenous insects – characteristic features of order Lepidoptera
- 1.2 Characteristic features of families - Bombycidae and Saturniidae – economic importance of insects
- 1.3 Classification of silkworms – based on origin, geographical distribution voltinism & moulting, - popular mulberry silkworm races – indigenous commercial and exotic species of India.
- 1.4 Biology of silkworm – life cycle, morphology of B.mori:- egg, larva, pupa and moth

UNIT – 2: Anatomy and physiology of Silkworm

- 2.1. Digestive and circulatory system
- 2.2. Respiratory and excretory system
- 2.3. Nervous and reproductive system
- 2.4. Sense organs – photoreceptors, chemoreceptors and mechanoreceptors

UNIT – 3: Endocrine glands and control of moulting & voltinism

- 3.1. Glands of silkworm: exocrine and endocrine glands of silkworms
- 3.2. Voltinism and moulting in silkworm
- 3.3. Hormonal basis of moulting and voltinism
- 3.4 Factors that influence moulting and voltinism

UNIT – 4: Silk and Biosynthesis

- 4.1. Silk gland – Structure, development and functions
- 4.2. Constituents of silk
- 4.3. Structure and composition of silk proteins
- 4.4. Factors controlling silk production

Seri 107 PRACTICALS Paper - II

1. Mulberry and Non-Mulberry silkworms – Comparative study of egg, larva, pupa and moth.
2. Anatomy of Silkworm, *Bombyx mori* L. – Mouth parts, Digestive, Respiratory, Nervous system, Silk gland, and Reproductive system - (male & female)
3. Embryology – identification of different stages in development. Mounting of embryo.
4. Estimation of Proteins, Carbohydrates and Lipids in blood (haemolymph) and mid gut of silkworm.
5. Estimation of amylase activity levels in blood and gut fluid of silkworm.
6. Estimation of excretory products in silkworm litter.
7. Gravimetric analysis of silk gland in different sexes/breeds of silkworm in relation with body weight

Reference Books

Afifa S. Kamili and Amin Masoodi M (2000) **Principles of Temperate Sericulture**. Kalyani Publishers, Ludhiana.

Basavaraja, H. K., Aswath, S. K., Suresh Kumar, N., Mal Reddy, N. and Kalpana, G. V. (2005) **A Textbook on Silkworm Breeding and Genetics**. Central Silk Board, Bangalore.

Dandin, S. B. and Giridhar, K (2010) **Handbook of Sericulture Technologies (4th revised Edition)**. Central Silk Board, Bangalore.

Ganga, G. and Sulochana Chetty, J. (2012) **An Introduction to Sericulture. Second Edition**. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Hisao Aruga (1994) **Principles of Sericulture**. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Krishnaswamy, S., Narasimhanna, M. N., Suryanarayan, S. K. and Kamaraj, S. (1973) **Sericulture Manual 2- Silkworm Rearing**. Food and Agricultural services Bulletin 15/2. Food and Agriculture Organization of the United Nations, Rome.

Madan Mohan Rao (1999) **Comprehensive Sericulture Manual**. B. S. Publications, Hyderabad.

Manjunath, D., Himantharaj, M. T., Balavenkatasubbaiah, M. and Rahamathulla, V. K. (2008) **Practical Manual on Silkworm Rearing (BLPI-003)**, Certificate in Sericulture, IGNOU, New Delhi.

Pandey, P. N., Sharan, S. K. and Mishra, P. K. (2005) **Silk Culture: A Biochemical Approach**. A. P. H. Publishing Corporation, New Delhi.

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER – I
PAPER – IV

SERI 104: MULBERRY & SILKWORM CROP PROTECTION - THEORY

UNIT-1 Mulberry diseases and their management

- 1.1 Foliar- Causative agent, symptoms and management
- 1.2 Stem- Causative agent, symptoms and management
- 1.3 Root- Causative agent, symptoms and management
- 1.4 Disease scoring- method, calculating the % of disease index

UNIT-2: Mulberry pests and their management

- 2.1 Pest of leaf and its managements
- 2.2 Pest of stem and its managements
- 2.3 Pest of root and its managements
- 2.4 Integrated Pest Management (IPM)

UNIT – 3 Silkworm diseases and their management

- 3.1 Silkworm diseases- viral diseases- Nuclear polyhedrosis and cytoplasmic polyhedrosis- infections flaccherie – causative agent, source of infection, root of infection, pre disposing factors, symptoms and their management
- 3.2 Bacterial diseases- bacterial diseases of digestive system, sotto, septicemia- causative agent source of infection- root of infection-. Pre disposing factors, symptoms and their management.
- 3.3 Microsporodian diseases- pebrine- history-causative agent- life cycle- root of transmission- symptoms and their management
- 3.4 Fungal diseases – white and green muscardine – causative agent, life cycle- symptoms and their management.

UNIT-4 Pests of Silkworm and its management

- 4.1 Uzi fly – Types, morphology and life cycle.
- 4.2 Demestid beetle- morphology and life cycle.
- 4.3 Predators of Silkworm
- 4.4 Integrated Pest Management (Physical, Chemical and Biological)

PRACTICALS

1. Identification of different mulberry diseases and estimation of loss.
2. Collection, categorization and identification of insect pests of mulberry and estimation of loss.
3. Preparation and application of different insecticides/pesticides/weedicides and their schedule.
4. Identification of different diseases of Silkworm viz., Grasserie, Flaccherie, Muscardine and Pebrine.
5. Microscopic examination of silkworm pathogens viz., BmNPVPolyhedra, Bacteria, Mycelia and conidia of white muscardine and Pebrine spores.
6. Isolation and culturing of bacteria/fungus.
7. Preparation of different recommended disinfectants.
8. Estimation of required quantity of disinfectant solution for different dimensions of rearing houses and disinfection method.
9. Demonstration of personal and rearing hygiene.
10. Application of different bed disinfectants and their schedule.
11. Identification of male and female of uzi fly, egg, maggot and pupa.
12. Estimation of uzi damage at the level of silkworm rearing.
13. Identification of bio-control agents of uzi fly.
14. Identification and management of dermestid beetles.

Reference Books

- Govindaiah, Gupta, V. P., Sharma, D.D., Rajadurai, S. and NoshithaNaik, V. (2005) **A Text book on Mulberry Crop Protection.** *Central Silk Board, Bangalore.*
- Govindan, R., Narayanaswamy, T.K. and Devaiah, M.C. (1998) **Principles of Silkworm Pathology.** *Seri Scientific Publihers, Bangalore.*
- Huang Ertian(Ed.) (2003) **Protection of Mulberry Plants (Translated from Chinese).** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*
- Jolly, M.S., Sen, S.K., Sonwalkar, N. and Prasad, G. K. (1979) **Sericulture Manual 4- Non Mulberry Silks.** *Food and Agriculture services Bulletin 15/4. Food and Agriculture Organization of the United Nations, Rome.*
- Khan, M.A., Anil Dhar. Zeya, S.B. and Trag, A. b.(2004) **Pests and Diseases of Mulberry and their Management.** *Bishen Singh Mahendra Pal Singh publisher, Dehradun.*
- Lu Yup-lian (1991) **Silkworm Diseases.** *FAO Agricultural Services Bulletin 73/4. Food and Agriculture Organization of the United Nations, Rome.* Translated by Liu Fu-an
- Narayanaswamy, K.C. and Devaiah, M.C.(1998) **Silkworm Uzi fly.** *Zen Publishers, Bangalore.*
- Nataraju, B.; Balavenkatasubbaiah, M.; Selvakumar, T. and Sharma, S. D. (2003) **Illustrated Handbook on Silkworm Disease Control.** *Edited by Dr. K. Kawakami and Dr. H. Yanagawa, PEBS project, JICA.*
- Nataraju, B., Sathyaprasad, K., Manjunath, D. and Aswani Kumar, C. (2005) **A Textbook on Silkworm Crop Protection.** *Central Silk Board, Bangalore.*
- Nataraju, B. and Balavenkatasubbaiah, M. (2008) **Unit1: Silkworm Diseases and their Management, under Block 2: Silkworm Diseases and Pest Management in Crop Protection (BLP-004), IGNOU, New Delhi.**
- Singh, R. N. and Saratchandra, B. (2011) **Sericultural Entomology.** *A.P.H. Publishing Corporation, New Delhi.*
- Singh,R.N., Samson, M.V. and Datta, R.M. (2000) **Pest Management in Sericulture.** *Indian Publishers Distributors.*
- Soo-Ho Lim, Yong- Teak Kim , Sang- Poong Lee, In – Jun Rhee, Jung-Sung Lim andByung- Ho Lim (1990) **Sericulture Training Manual.**[*Published by arrangement with the Food and Agriculture Organization of the United Nations*] *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*
- Tribhuvan Singh and Pramod Kumar Singh (2013) **Mulberry Crop Protection.** *Discovery Publishing House Pvt. Ltd., New Delhi.*

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
Seri 105 FOUNDATION COURSE

Value Addition in Sericulture - THEORY

UNIT – I

Value addition from mulberry leaf:- Animal feed Importance, mulberry leaf extraction in reducing blood glucose, reducing Blood fat, strengthening blood vessels, cosmetic production, Health benefits of mulberry leaves (Tea, Soap, Atherosclerosis)

Value addition to mulberry fruit:- Multipurpose uses of mulberry fruit, mulberry fruit jam, mulberry fruit chutney etc.

Value addition products from mulberry stem:- Mulberry as fodder and fuel, mulberry wood art, utilization of mulberry twigs for basket making, agricultural and sports items etc

Recycling technology of sericulture waste:- preparation of compost from sericulture waste, silkworm litter for biogas generation, vermicomposting of silk waste, Livestock maintenance, Agriculture, Biogas slurry

Value addition to silkworm:- commercial food

Value addition to silkworm pupae:- cereal diet, use of pupal chitin, use of pupal fat and oil, pupae as broilers diet ruminant diet, Pig diet; organic fertilizers, health products pupae diet as astronaut food, paints & vanishes.

UNIT – II

Silk reeling waste and cocoon waste utilization for value addition micro tubes, use in biomedical and bioengineering field, pharmaceutical industry, art craft, interior decoration.

Grainage waste and value addition:- utilization of cut and pierced cocoons, pharmaceutical industry, value addition to silk moth.

Non mulberry sericulture waste utilization for value addition: - Tasar, muga and eri waste – garland, silk paper, silk package material, spun silk & noil silk, importance of quilts
Impact of value added byproducts as entrepreneurship.

REFERENCE BOOKS:-

1. Kundu, S. (ed) (2014) Silk biomaterials for tissue engineering & regenerative medicine, Elsevier.
2. Internet (Literature).

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER-II
PAPER-V

SER-201 SILKWORM REARING TECHNOLOGY - THEORY

UNIT – 1: Rearing requirements

- 1.1 Silkworm rearing house;- model rearing house, different types of rearing house, different type of rearing houses.
- 1.2 Rearing appliances and its role
- 1.3 Environmental factors – effect of temperature, humidity, air and light on growth and development of larvae and optimum conditions for rearing and its effect on rearing
- 1.4 Disinfection: disinfectants its importance, disinfection methods, preparation of disinfectants and bed disinfectants

UNIT – 2: Incubation, Hatching and Brushing

- 2.1 Incubation – Definition, importance, method of incubation: black boxing and its importance
- 2.2 Hatching – Definition, hatching percentage calculation
- 2.3 Brushing – Definition, types of brushing and its importance and quantity
- 2.4 Quality and quantity of mulberry leaves - selection – its effect on growth of silkworm

UNIT – 3: Rearing of silkworms

- 3.1 Chawki rearing, importance, characteristics – methods of chawki rearing - advantages and disadvantages
- 3.2 Role of chawki rearing centre (CRCS) & its advantages – profits
- 3.3 Late age silkworm rearing, importance – characteristics, methods of late age rearing – advantages and disadvantages
- 3.4 Moulting – definition, care during moulting – use of bed disinfectants, spacing, bed cleaning – definition, types and advantages

UNIT – 4: Spinning – mounting and cocoon harvesting

- 4.1 Ripening of worms – identification of ripen worms, process of spinning, environment conditions during spinning
- 4.2 Mounting – definition, methods of mounting – care during mounting – types of mountages – advantage and disadvantages of each mountage
- 4.3 Cocoon harvesting – definition – time of harvesting – harvesting methods, defective cocoons – causes and types of defective cocoons, how to avoid defective cocoons, cocoon sorting, transportation – care to be taken while transporting and marketing of cocoons
- 4.4 Rearing management to suit different seasons

Seri 206 Practicals – Paper IV

1. Model rearing house plan
2. Rearing equipments – rearing stand, tray, chop stick, ant wells, chopping knife – chopping board – feeding stand, foam pads – basin stand – feather – paraffin paper – hygrometer and mountages, dry and wet bulb thermometer, sprayer, etc
3. Disinfection of the rearing rooms and appliances – spraying and fumigation – materials required
4. Brushing – Methods of brushing – rearing young age worms, feeding, cleaning and spacing schedule for chawki silkworm rearing
5. Harvesting of leaf, leaf preservation for silkworm rearing, selection of quality leaf for different instar stages
6. Rearing of young age and late age silkworms, rearing – cellular and mass rearing
7. Spinning and mounting – different types of mountages – methods of mounting
8. Cocoon harvesting and assessment – categorization and separation of different type of cocoons
9. Maintenance of rearing records.

Reference Books

Afifa S. Kamili and Amin Masoodi M (2000) Principles of Temperate Sericulture. Kalyani Publishers, Ludhiana

Ganga, G and Sulochana Chetty, J. (1995) An Introduction to sericulture (3ed Reprinting) Oxford & IBH Publishing Co. Pvt Ltd, New Delhi

Krishnaswamy, S, Narasimhanna, M.N, Suryanarayan, S.K and Kamaraj, S (1973) Sericulture Manual -2 Silkworm rearing Food and Agricultural services Bulletin 15/2 Food and Agriculture Organization of the United Nations, Rome

Madan Mohan Rao (1999) Comprehensive Sericulture Manual, B.S Publications, Hyderabad

Manjunath, D, Himantharaj, M.T, Balavenkatasubbaiah, M and Rahamathulla, V.K 920080 Practical Manual on Silkworm rearing (BLPI-003), Certificate in sericulture, IGNOU, New Delhi

Rajan, R.K, Himantharaj, M.T, Singh, G.B, Nataraju, B and Balavenkatasubbaiah, M 920030 Illustrated

Handbook on silkworm rearing. Edited by Dr. K. Kawakami and Dr. H. Yanagawa, PEBS Project, JICA

Ganga, G 920030 Comprehensive Sericulture, Volume 2: Silkworm rearing and silk Reeling. Oxford & IBH Publishing Co. Pvt Ltd, New Delhi

Ullal, S.R and Narasimhanna, M.N (1987) Handbook of practical Sericulture 93rd Edition 0 Central Silk Board, Bangalore.

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER-II
PAPER – VI

SER-202 SILKWORM SEED PRODUCTION - THEORY

UNIT – 1 Silkworm seed production and organization

- 1.1 Types of silkworm eggs-silkworm races and hybrids
- 1.2 Seed organization set up in India – pure race maintenance
- 1.3 One way system of multiplication of basic stocks – Basic seed management and concept
- 1.4 Seed areas – importance, care and precautions to be taken in seed areas

UNIT – 2 Grainage

- 2.1 Quality seed cocoon production – Quality, pre-requisites, generation of seeds cocoons and handling of seed cocoons
- 2.2 Establishment of grainages – choice for site and grainage building plan
- 2.3 Grainage equipments
- 2.4 Disinfection of the grainages

UNIT – 3 Seed production process

- 3.1 Norms for procurements of seed cocoons – sorting and preservation of seed cocoons
- 3.2 Methodology for sex separation at pupal stage – preservation of pupae
- 3.3 Moths emergence – synchronization – collection of moths – coupling and decoupling of moths and preservation of male moths
- 3.4 Moth examination – its importance, different moth examination (green and dry) and precautions

UNIT – 4 Silkworm egg handling

- 4.1 Preparations of loose eggs and sheet eggs
- 4.2 Surface disinfection of eggs and packing
- 4.3 Artificial hatching of silkworm eggs (cold and hot acid treatment)
- 4.4 Egg preservation and hibernation schedules (3, 4 and 6 months)

Seri 207 PRACTICALS – Paper V

1. Model Grainage building Plan
2. Grainage equipments – cocoon storage equipments, microscopes, incubators, moth crushing unit, – cocoon cutting machine, trays, coupling trays, acid treatment bath.
3. Selection of seed cocoons- de flossing, sorting and selection of good cocoons.
4. Cocoon cutting - sex separation, pupal gut examination, calculation of sex ratio, pupation percentage
5. Moth emergence, time of emergence, identification of male and female moths – handling and protection.
6. Synchronization of emergence – refrigeration of cocoons/moths.
7. Pairing, de pairing, preparation of egg sheets /loose eggs, washing of loose eggs and drying.
8. Moth examination – Individual, sample and mass mother moth examination
9. Acid treatment of eggs- Hot and cold.
10. Preservation/refrigeration of layings – necessity of cold storage – time of releasing *etc.*
11. Dissection of silkworm eggs, staining- Observation of embryonic development in relation to preservation of eggs at different temperature.

Reference Books

Ganga, G. (2003) **Comprehensive Sericulture, Volume 2: Silkworm Rearing and Silk Reeling.** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Hisao Aruga (1994) **Principles of Sericulture.** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Jayant Jayaswal, Giridhar, K., Somi Reddy, J. and Jagadish Prabhu, H. (2008) **Mulberry Silkworm Seed Production,** *Central Silk Board, Bangalore.*

Manjeet S. Jolly (Ed.) (1987) **Appropriate Sericulture Techniques.** *International Centre for Training & Research in Tropical Sericulture, Mysore.*

Tribhuwan Singh, Madan Mohan Bhat and Mohammad Ashraf Khan (2010) **Silkworm Egg Science: Principles and Protocols.** *Daya Publishing House, Delhi.*

Ullal, S. R. and Narasimhanna, M. N. (1987) **Handbook of Practical Sericulture (3rd Edition).** *Central Silk Board, Bangalore.*

Wang San-ming (1989) **Silkworm Egg Production. Volume III.** *FAO Agricultural Services Bulletin 73/3. Food and Agriculture Organization of the United Nations, Rome.* Translated by Li Ping-Yi, Pan Run-shi and Ou Bing-sen

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER-II
PAPER – VII

SER-203 POST COCOON TECHNOLOGY - THEORY

UNIT-I Cocoon and silk fibers

- 1.1 Textile fibres- Brief introduction to natural & synthetic fibres and their uses. Cocoon characteristic, structure of fibre;
- 1.2 Physical and commercial characteristic of cocoons, importance and problems of reeling in industry.
- 1.3 Cocoon sorting – objectives & procedure: defective cocoons, marketing of cocoons- function & procedure.
- 1.4 Identification of silk fiber and silk uses

UNIT-II Cocoon Handling

- 2.1 Cocoon handling, Selection, preservation of cocoons,
- 2.2 Cocoon stifling:- objectives, factors and methods- sun drying, steam stifling, hot air drying, Yamato hot air dyers- advantages and disadvantages: cocoon sorting: preservation of cocoons.
- 2.3 Cocoon cooking:- Objective, factors and methods- open pan, three pan, pressurized, floating and sunken system- merits and demerits.
- 2.4 Brushing- objectives-method –advantage and limitations.

UNIT- III Silk reeling

- 3.1 Silk Reeling:- Evolution of silk reeling, reeling units - charaka, cottage basin, multi end , semi automatic and automatic reeling devices – components and their functions.
- 3.2 Re reeling and packing: objectives, grant reeling, hank preparation, lacing, skeining , booking, baling and bundling.
- 3.3 Raw silk properties- physical, chemical and microscopic; factor influencing the properties/ silk quality, silk exchange- structure and function.
- 3.4 Water for reeling, characteristics and its effect on silk

UNIT- IV Raw silk testing and grading

- 4.1 Raw silk testing and grading:- objectives of testing/ grading,
- 4.2 Raw silk testing: Visual, winding, evenness, cleanness, neatness, tenacity and elongation, cohesion and condition weight.
- 4.3 Raw silk grading- international standards and bureau of International BIS.
- 4.4 Doubling, twisting, weaving, degumming, bleaching and silk dyeing- objectives and methods.

Seri 208 PRACTICALS - Paper VI

1. Identification of textile fibres by microscopic, physical & chemical tests.
2. Physical & commercial characters of cocoons in MV & BV races /breeds
3. Cocoon sorting – determination of good cocoon percentage & various defective cocoon percentage (number & weight)
4. Determination of shell ratio percentage of cocoons & assessment of their estimated renditta.
5. Cocoon stiffing & cooking
6. Determination of filament length / renditta and denear
7. Determination of alkalinity & hardness of reeling water by titration method
8. Identification of reeling machines & their components
9. Estimation of degumming loss in multivoltens and bivoltens cocoons & raw silk
10. Visit to weaving centers, dyeing & printing units (nearby)
11. Study of different types of waste.

References

Abdul Aziz and Hanumappa, H. G. (Eds.) (1985) **Silk Industry: Problems and Prospects.** *Ashish Publishing House, New Delhi.*

Bibhuti Nath Jha (2012) **Silk Industry in India.** *Satyam Publishing House, New Delhi.*

Dhote, A. K. (1989) **Sericulture Instructional-cum-Practical Manual, Volume V: Silk Reeling, Testing and Spinning.** *National Council of Educational Research and Training, New Delhi.*

Huang Guo Rui (1998) **Silk Reeling (Cocoon Silk Study) [Translated from Chinese]** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Kim, Byung-Ho (1989) **Raw Silk Reeling.** *Associated Business Centre Limited, Colombo, Sri Lanka.*

Krishnaswami, S., Madhava Rao, N. R., Suryanarayan, S. K. and Sundaramurthy, T. S. (1972) **Manual-3, Silk Reeling.** *FAO Agricultural Services Bulletin 15/3. Food and Agriculture Organization of the United Nations, Rome.*

Mahadevappa, D., Halliyal, V. G., Shankar, A. G. and Ravindra Bhandiwad (2000) **Mulberry Silk Reeling Technology.** *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.*

Somashekar, T. H. and Kawakami, K. (Eds.) (2002) **Manual on Bivoltine Silk Reeling Technology 2002.** *JICA, PPP BST Project, CSR&TI, Mysore.*

Thammanna N. Sonwalkar (2001) **Handbook of Silk Technology.** *New Age International (P) Limited, Publishers, New Delhi.*

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE
SEMESTER-II
PAPER-VIII

SER-204 SERICULTURE EXTENSION - THEORY

UNIT – 1 Sericulture extension & Research institutes

- 1.1 Sericulture extension: Objectives, principles and classification of Sericulture extension, extension teaching methods-merits and demerits of each method.
- 1.2 IVLP - Objectives, methodology and implementation.
- 1.3 Research institutes & training centers in Sericulture for farmers & students.
- 1.4 NSP, future scope.

UNIT – 2 Scope for development of women in Sericulture

- 2.1. Scope for development and limitation in Sericulture
- 2.2 Government schemes
- 2.3 Schemes for financial assistance, sources of Sericulture finance, rural indebtedness, lead bank schemes - NABARD, IRDP, DRDA, World Bank, etc, crop insurances.
- 2.4 Women in Sericulture, current status – possibilities of large women involvement in future & health hazards.

UNIT – 3 Sericulture extension – communication and motivation

- 3.1 Communication - Definition, concepts, nature, characteristics, importance of communication process – levels - types – theories.
- 3.2 Principles & barriers of communication – Feedback and its importance in communication.
- 3.3 Motivation - Definition, concept, nature, characteristics, importance, process, types of motivation.
- 3.4 Performances, theories and principles of motivation.

UNIT – 4 Sericulture extension program & planning

- 4.1 Extension programs - objectives, need, nature, pathways & evaluation of programs.
- 4.2 Principles & forms of extension programs.
- 4.3 Planning - Importance and advantage of planning – planning strategy for sericulture extension.
- 4.4 Decision in sericulture extension: - importance – nature – principles – types, limitation of resources, problems of decision making.

Reference Books

Burton E. Swanson, Robert P. Bentz and Andrew J. Sofranko (2005) **Improving Agricultural Extension: A Reference Manual**. *Daya Publishing House, New Delhi.*

Dhote, A. K. (1989) **Sericulture Instructional-cum-Practical Manual, Volume VI: Sericulture Extension Management**. *National Council of Educational Research and Training, New Delhi.*

Kumaresan, P. and Srinivasa, G. (2005) **A Text Book on Sericulture Extension Management and Economics**. *Central Silk Board, Bangalore.*

Ramana, D. V. (1987) **Economics of Sericulture and Silk Industry in India**. *Deep & Deep Publications, New Delhi.*

Tribhuvan Singh, Madan Mohan Bhat and Mohammad Ashraf Khan (2009) **Sericulture Extension: Principles and Management**. *APH Publishing Corporation, New Delhi.*

KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE

OPEN ELECTIVE

Seri 205 - Sericulture and Entrepreneurial Development - Theory

UNIT – 1 Sericulture – Scope of entrepreneurship

- 1.1 General introduction to sericulture and its distribution in India. Sericulture organizations in India.
- 1.2 Insect and non insect fauna producing silk; types of silk produced in India; status of mulberry and non mulberry sericulture in India.
- 1.3 Scope of sericulture in India, employment potential and income generation
- 1.4 Entrepreneurship development program (EDP) for new enterprise creation, emergence and objectives

UNIT – 2 Entrepreneurship in Mulberry

- 2.1 Host plants of mulberry silkworm, mulberry varieties for irrigated and rainfed conditions.
- 2.2 Soils, location and climate for mulberry cultivation. Package of practices for mulberry cultivation under rainfed and irrigated conditions
- 2.3 Pests and diseases of mulberry and their management
- 2.4 Entrepreneurship development in mulberry – Kisan nursery, vermicompost, Bio-fertilizer and biogas

UNIT – 3 Entrepreneurship in Seed technology and rearing

- 3.1 Silkworm seed organization and its significance; importance of seed areas (bivoltine and multivoltine) and silkworm seed legislation act
- 3.2 Grainage operations: Grainage building, procurement and preservation of seed cocoons, sexing, moth emergence, mating, oviposition – sheet and loose egg, preparation, mother moth examination, surface sterilization of eggs, acid treatment of hibernating eggs, packing and sale of eggs. Entrepreneurship development in silkworm egg production
- 3.3 Rearing operations: life cycle of the silkworm, *Bombyx mori*; transportation and incubation of eggs, disinfection, brushing, young and late-age rearing, environmental requirements, feeding cleaning, spacing, care during moult, hygiene maintenance, mounting and spinning, cocoon harvesting, transportation, marketing and cocoon markets.
- 3.4 Entrepreneurship development in silkworm rearing – chawki rearing units, mass disinfection units, polyclinics and production of bio-control units.

UNIT – 4 Entrepreneurship in reeling

- 4.1 Physical and commercial characteristics of cocoons. Cocoons sorting – defective cocoons. Cocoons stifling – objectives and methods; cocoon preservation and cocoon cooking – objectives and methods.
- 4.2 Reeling water – quality and its importance, silk reeling, different reeling – units – charaka, cottage, basin, multi-end, semi-automatic and automatic; re-reeling and packing-objectives and operations –m entrepreneurship development in silk reeling establishment of reeling units.
- 4.3 Introduction to textile fibres: types – natural and synthetic fibers, importance of silk fibre; silk production. Properties of mulberry silk, silk testing and grading – objectives; silk exchange, weaving and dyeing.
- 4.4 Entrepreneurship development in bye-products utilization – mulberry silkworm larva, pupa, moth, silk reeling and handicrafts.

Reference Books

Ganga, G and J Sulochana chetty (1991) **An introduction to sericulture: oxford & IBM publishing company, (both editions)**

Manuals & Silkworm rearing agriculture service bulletin, FAO, Rome

Bibhide Nath Jha (2012) **Silk industry in India**, Satyam publishing house, New delhi

Somasekhar, TM & Kawa Kami, Eds (2002) **Manual on Bivoltine Silk reeling Technology**, BST project CSRTI, Mysore

Muang guo Rui (1998) **Silk reeling** – Oxford & IBM publishing Co. Pvt. Ltd

Govindaiah Gupta VP D Rajadurai, S. Nishetha Naik (2005) **A text book on mulberry crop protection**, Central Silk Board, Bangalore.

**KAKATIYA UNIVERSITY
FACULTY OF SCIENCE
PG DIPLOMA IN SERICULTURE**

PROJECT WORK EXPERIENCE

25 marks

1 credit

- Village attachment training program
- Program may be on moriculture, rearing, reeling, chawki rearing, grainages, dyeing, printing technologies.
- Employment and income generation through the farms – case study
- Skill development in all aspects of moriculture, rearing, reeling, grainage and other related activities.

Thanking you

Chairperson
BOS in Sericulture