SYLLABUS FOR

M.SC. COURSE IN SERICULTURE

(with effect from the academic year 2023 - 2024 under CBCS system)

DEPARTMENT OF SERICULTURE

KAKATIYA UNIVERSITY

HANAMKONDA, WARANGAL – 506 009

TELANGANA STATE, INDIA

KAKATIYA UNIVERSITY

Accredited by NAAC 'A' Grade

Vidyaranyapuri, Warangal, T.S. - 506 001

Dr. Kaneez Fatima
M.Sc. Ph.D.
Chairperson Board of Studies in Sericulture

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Lr.No.28/Seri/UC/KU/2023 Date:27-01-2023

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

Sub: Approval - M.Sc. in Sericulture - Syllabus for I,II,III & IV semesters - Submission - Requested - Reg.

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In accordance with the subject cited above, I am herewith enclosing the Board of Studies approval Syllabi (Semester pattern) along with the distribution of marks and credits of M.Sc. course being offered in University Colleges, under the jurisdiction of Kakatiya University under choice based credit System (CBCS) with effect from 2023 - 2024 academic year. the approved syllabi are being enclosed.

Hence, kindly accept and acknowledge with necessary approval from the appropriate body for the implementation from the current academic year (2023 - 2024).

Thanking you,

Enclosures:
1. Approved syllabi of semester pattern of M.Sc. Sericulture
2. Approved syllabi, distribution of marks & credits for the given subject

Yours faithfully

Chair Person,
BOS in Sericulture

Copy to:

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

MINUTES OF THE MEETING

The Board of Studies members of Sericulture ,Kakatiya University had a virtual meeting on 23-01-2023 At 10.00 am in the chamber of Head, Department of Zoology and the following members were present.

1. Dr.Kaneez Fatima, Chairman, BOS
2. Dr.M.Estari, Incharge Sericulture,KU
3. Prof.M. Manoj Rai, External member.
4. Dr. B.Satyanarayana, External member.
5. Dr. K. Sujatha, Member.

In the meeting, the following resolutions were made.

1. It was resolved to approve the syllabus of M.Sc Sericulture course by all the members.
2. The examination pattern was framed as CBCS system.
3. In III & IV semester Electives were proposed and approved.
4. The curriculum, scheme of examination and allocation of marks for each paper is finalised and approved.

The approved syllabus of the course is enclosed herewith for circulation to the concerned Department and website of the University.

Dr. Kaneez Fatima
Chairman, BOS

Prof.M. Manoj Rai
External Member
Director
Centre of Sericultural & Management Research
R.T.M. Nagpur University, Nagpur-22

Dr.M. Estari
I/c Head, Member

Dr. B. Satyanarayana
Dr.B.Satyanarayana
Assistant Professor
External Member
Dept.of Sericulture
S.K.University - 515003

Dr.K. Sujatha
Dr. K. Sujatha
Member
M.Sc (Seri & Zool), Ph.D.,
Asst. Prof. of Seri
KAKATIYA UNIVE
Hanumakonda Di

SYLLABUS FOR

M.SC. COURSE IN SERICULTURE

Paper	Title of the Paper
SEMESTER - I	
I	General Sericulture - An Over view
II	Mulberry Biology & Production
III	Mulberry Diseases and Pests - Their Crop Protection
IV	Silkworm Biology and Physiology
SEMESTER - II	
I	Grainage Technology
II	Silkworm Rearing Technology
III	Silkworm Genetics and Breeding
IV	Diseases and Pests of Silkworm and their Management
SEMESTER - III	
I	Cocoon Processing Technology
II	Textile Technology
III	Sericulture extension and management **(Elective - I)** **(OR)** Science of Sericulture **(Elective -II)**
IV	Value addition in Sericulture **(Elective -III)** **(OR)** Seri bio craft Technology **(Elective - IV)**
SEMESTER - IV	
I	Vanya Sericulture
II	Fundamentals of Computer Sciences
III	Entrepreneurship in Sericulture **(Elective - I)** **(OR)** Economics of Sericulture **(Elective - II)**
IV	Women Empowerment in Sericulture **(Elective - III)** **(OR)** Seri biodiversity and biotechnology **(Elective - IV)**

KAKATIYA UNIVERSITY, DEPARTMENT OF SERICULTURE
(with effect from the academic year 2023 - 2024 under CBCS system)

Sl. No.	Paper code	Title of the paper	Instructions Hrs./week	No. of credits	Marks		Total Marks
					External	Internal	
SEMESTER - I							
1	Seri 101	General Sericulture - An Over View	4	4	80	20	100
2	Seri 102	Mulberry Biology & Production	4	4	80	20	100
3	Seri 103	Mulberry Diseases and Pests - Their Crop Protection	4	4	80	20	100
4	Seri 104	Silkworm Biology and Physiology	4	4	80	20	100
5	Seri 105	Practical - I	4	4	80	20	100
6	Seri 106	Practical - II	4	4	80	20	100
7	Seri 107	Seminar	-	1	-	25	25
		Total:	**24**	**25**	**520**	**105**	**625**
SEMESTER - II							
1	Seri 201	Grainage technology	4	4	80	20	100
2	Seri 202	Silk worm rearing technology	4	4	80	20	100
3	Seri 203	Silkworm genetics & breeding	4	4	80	20	100
4	Seri 204	Diseases and Pests of Silkworm and their Management	4	4	80	20	100
5	Seri 205	Practical - I	4	4	80	20	100
6	Seri 206	Practical - II	4	4	80	20	100
7	Seri 207	Seminar	-	1	-	25	25
		Total:	**24**	**25**	**520**	**105**	**625**

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SEMESTER - III							
1	Seri 301	Cocoon Processing Technology	4	4	80	20	100
2	Seri 302	Textile Technology	4	4	80	20	100
3	Seri 303	**Subject Elective-I** Sericulture extension and management **(OR)** **Subject Elective-II** Science of sericulture	4	4	80	20	100
4	Seri 304	**Subject Elective-III** Value addition in Sericulture **(OR)** **Subject Elective-IV** Seri bio craft Technology	4	4	80	20	100
5	Seri 305	Practical - I	4	4	80	20	100
6	Seri 306	Practical - II	4	4	80	20	100
7	Seri 307	Seminar	-	1	-	25	25
		Total:	**24**	**25**	**520**	**105**	**625**
SEMESTER - IV							
1	Seri 401	Vanya Sericulture	4	4	80	20	100
2	Seri 402	Fundamentals of Computer Sciences	4	4	80	20	100
3	Seri 403	**Subject Elective-I** Entrepreneurship in Sericulture **(OR)** **Subject Elective-II** Economics of Sericulture	4	4	80	20	100
4	Seri 404	**Subject Elective-III** Women Empowerment in Sericulture **(OR)** **Subject Elective-IV** Seri biodiversity and biotechnology	4	4	80	20	100
5	Seri 405	Practical - I	4	4	80	20	100
6	Seri 406	Practical - II	4	4	80	20	100
7	Seri 407	Project	-	1	-	25	25
		Total:	**24**	**25**	**520**	**105**	**625**
		Grand Total (Sem-I+II+III+IV)		**100**	**2080**	**420**	**2500**

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DISTRIBUTION OF MARKS AND CREDITS

Paper	Max.Marks	No. of credits
Theory (4 semesters)	4 x 4 x 100 = 1600	4 x 4 x 4 = 64
Practicals (4 semesters)	4 x 2 x100 = 800	4 x 2 x 4 = 32
Seminars	3 x 1 x 25 = 75	3 x 1 x 1 = 03
Project Work	1 x 1 x 25 = 25	1 x 1 x 1 = 01
Total:	**2500**	**100**

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FIRST YEAR – SERICULTURE

SEMESTER – I

AND

SEMESTER – II

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SEMESTER - I

PAPER CODE: SERI 101

GENERAL SERICULTURE - AN OVER VIEW - THEORY

Unit - I: Global Textile and Silk Scenario

1.1 **Introduction to textile fibres;** type - natural and synthetic fibres and their properties; identification & use of silk fibre.

1.2 Insect and non-insect fauna producing silk; types of silks produced in India.

1.3 Origin and history of sericulture; silk road; status of mulberry & non mulberry sericulture - globally; export and import.

1.4 Scope, Characteristics of sericulture vis-a-vis other agricultural crops; prospects and problems of Sericulture industry.

Unit - II: Organization set up and Employment potential

2.1 Sericulture organization and its functions and technical man power management in India.

2.2 Research and Training in Sericulture.

2.3 Sericulture as Rural Industry.

2.4 Employment and income generation for youth and women through sericulture.

Unit - III: Silk Industry and Silk fiber

3.1 Silk industry in W.B, J & K, TN, AP, Telangana.

3.2 **Constraints in silk production-** Labour, land, environmental conditions and production cost.

3.3 Advantages of silk fiber over other fibers.

3.4 Quality of different types of natural and synthetic fibers.

Unit - IV: Financing Agencies & Project formulation

4.1 **Financing agencies** - Rural indebtedness; Remedies, subsidies; Bank financing system; Crop insurance and its scope.

4.2 **Survey** - objectives of Survey; Socio-economic conditions of people (Sericulture & Agriculture crops).

4.3 **Project** - Objectives; present condition of infrastructure availability; staff requirement; training programme, preparation & presentation of project report.

4.4 **Farm Management** - Different farming systems, maintenance of small and large farms and field records.

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REFERENCE BOOKS :

Dhote, A.K. (1989) Sericulture Extension and Management. *National Council 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*.

HisaoAruga (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 India Silk: A Wealth of Opportunities. *Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi*.

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SEMESTER - I

PAPER CODE: SERI 102

MULBERRY BIOLOGY AND PRODUCTION-THEORY

Unit - I: Mulberry and its botanical aspects

1.1 **History** - Origin, Phytogeography and Systematics of genus Morus. L its varieties and species.

1.2 **Morphology** - Root, Stem, leaf, flower, fruit and seed.

1.3 **Anatomy** - Root, stem, leaf, flower, fruit and seed.

1.4 **Reproductive biology of mulberry** - development of anther, pollen and male gametophyte, megaspore and female gametophyte, pollination, fertilization, embryo and seed development.

Unit - II: Agro-climatic factors on mulberry growth and development

2.1 **Edaphic factors**- Soil types , texture, porosity, organic matter, macro and micro nutrients and their deficiency symptoms.

2.2 **Climatic factors** - Its influence on growth and productivity of mulberry.

2.3 **Nurseries** - their importance, raising and maintenance of nurseries.

2.4 Genetic improvement through selection and hybridization.

Unit - III: Mulberry plantation and Establishment

3.1 Selection and preparation of land, soil testing, machinery employed in mulberry cultivation, selection of various mulberry varieties under irrigated and rainfed conditions, characteristic features and yield.

3.2 **Propagtion**- Types of reproduction (sexual and asexual) and their advantages and disadvantages.

3.3 **Planting systems** - Row & pit system, paired row system and Kolar system.

3.4 **Manures**- organic and inorganic manures and their dosages.

Unit - IV: Package of Practices for Mulberry Cultivation

4.1 **Weed and its management**-common weeds, problems posed by weeds, preventive &control measures (physical, chemical, biological and integrated weed management); inter cultivation and mulching.

4.2 **Water management** - Water requirement, its resources, quality, schedule of irrigation and irrigation systems, water management practices in dry land.

4.3 **Nutrient management** - manures, chemical and bio-fertilizers, foliar nutrition and integrated nutrient management.

4.4 Types, objectives and methods for pruning, harvesting transportation and storage of mulberry leaves.

PRACTICALS :

1. Taxonomy of mulberry with reference to various species and varieties growth 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 se 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*.

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

Rangaswmay, G., Narasimhana, 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., Bhogesha, 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*.

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SEMESTER - I

PAPER CODE: SERI 103

MULBERRY DISEASES PESTS AND THEIR CROP PROTECTION-THEORY

Unit - I: Basic concepts of Mulberry diseases

1.1 Introduction to plant diseases and importance of plant protection. influence of biotic and abiotic factors on the incidence of plant disease.

1.2 Pathogenesis of diseases.

1.3 Classification of mulberry diseases.

1.4 Fungal diseases of mulberry causal organism, classification occurrence, symptoms, etiology and management.

Unit - II: Viral and bacterial diseases

2.1 Viral diseases of mulberry causal organism, occurrence, symptoms, etiology and management.

2.2 Bacterial diseases of mulberry, causal organism, occurrence symptoms, etiology and Management

2.3 **Dwarf diseases of mulberry**- causal organism, occurrence, symptoms, ethiology and management.

2.4 Mineral deficiency symptoms and remedial measures in mulberry.

Unit - III: Basic concepts of pest and major mulberry pest.

3.1 **Pests** - definition, categories of pest, concept.

3.2 Strategies of pest management.

3.3 Major pests, leaf roller, Bihar harry caterpillar mealy bugs, scale insect and thrips.

3.4 Their damage and management.

Unit - IV: Minor pests & pesticides.

4.1 Minor pests, grass hopper, stem girdlers, termites, beetle jessed and mules - their damage and management.

4.2 Pesticides forms, formulation calculation and application of Pesticides.

4.3 Different types of sprayers and dusters.

4.4 Integrated pest management.

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PRACTICALS:

1. Collection, categorisation and identification of different mulberry diseases estimation of loss.
2. Collection, categories action and identification of pests of mulberry estimation of loss; bcharchisy caterpillar, scale insects, mealy bugs, jassed, trips beetles, grass hoppers.
3. Study of powdery mildews through sectioning, staining and temporary mounting.
4. Study of leaf spot sectioning staining and temporary mounting.
5. Study of leaf rust through sectioning, staining and temporary mounting.
6. Study of root knot nematodes in mulberry through sectioning staining and temporary mounting.
7. Study of pesticides, their formulation, application (Sprayers and dusters)

REFERENCE BOOKS:

Boraiah, G (1994). Lectures in Sericulture, SBS publishers, Bangalore.

Borror, D.J and Delong, D.M. (1960) Introduction of insects Holf, New York.

Huang, E (2003) Protection of Mulberry Plants, Oxfrod of IBM publishing Co. Pvt. Ltd.,

Reddy, D.N. R & Narayana Swamy, K.C. (2003) Pests of Mulberry, Zen Publishers, Bangalore.

Sukumar, J; Dandia S.B. & Bongale V.D. (1994) Mulberry Disease and Management, K.S.S.R.DI, Bangalore

Trivedi P.C. (Ed) (2001) Plant Pathology, Pointer Publishers, Jaipur, India.

Khan, MA, Anil Dhar, Zeya, S.B. Trag; A.B. (2004) Pests and Diseases of Mulberry and their Management, Bishan Singh, Mahendra Pal Singh Publisher, Dehradun.

Tribhuvan Singh & Pramod Kumar Singh (2013) Mulberry Crop Protection, Discovery Publishing House, Pvt. Ltd., New Delhi.

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SEMESTER - I

PAPER CODE: SERI 104

SILKWORM BIOLOGY AND PHYSIOLOGY - THEORY

Unit - I: Classification and biology of Silkworm

1.1 **Serigenous insects** - Salient features of class insects-classification of serigenous insects, characteristic features of order Lepidoptera.

1.2 **Characteristic features of families** - Bombycidae and saturnidae, economic importance of insects.

1.3 **Classification of Silkworms** - based on origin, geographical distribution based on voltanism & moultinism. popular mulberry silkworm races - indigenous commercial and exotic species of India.

1.4 **Biology of mulberry silkworm** - morphogy and life cycles.

Unit - II: Physiology of Silkworm

2.1 D**igestive system** - Feeding behaviour, Nutritional requirements, Digestive enzymes (Secretion & its role in digestion) absorption.

2.2 **Circulatory system** - Heartbeat, hormonal control role of alary muscles and physiology of circulation nervous system - physiology of nervous system during metamorphosis.

2.3 **Respiratory system** - Tracheal system (Ventilation and diffusion), factors affecting respiration.

Excretory system - Malpighian tubules (Ultrastructure and functions), physiology of excretion.

2.4 **Reproduction** - Male and Female reproductive systems, insect ovary, Oocyte development, Vitellogenesis.

Unit - III: Endocrine glands and control of moulting & Voltinism

3.1 **Glandular System** - Structure and function of silk gland, exuvial gland, salivary gland, tracheal gland, prothoracic gland, suboesophageal gland and peritracheal gland.

3.2 Hormonal basis of moulting and voltinism.

3.3 Factors that influence moulting and voltinism.

3.4 **Neuroendocrine system** - chemical nature and mode of action of neuro endocrine hormones (brain, moulting, juvenile and diapause hormones)

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Unit - IV: Silk and Biosynthesis

4.1 Biosynthesis of silk and its physical and chemical properties.

4.2 Constituents of silk

4.3 Structure and composition of silk proteins.

4.4 Maintenance of silk (Keeping, washing, pressing and removal of stains).

PRACTICALS :

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., Mai 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.*

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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.*

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SEMESTER - II

PAPER CODE: SERI 201

GRAINAGE TECHNOLOGY- THEORY

Unit - I: Silkworm seed production and management

1.1 **Quality seed organisation** - Importance of quality seed cocoon production norm & procedures followed in P_3, P_2& P_1 levels.

1.2 **Seed organisation set up in India** - Pure & hybrid races maintenance.

1.3 **Seed areas** - Importance & maintenance of seed areas & selected seed reares seed legislation act, control of pests & predator in grainages.

1.4 **Norms transportation of seed cocoons** - marketing of bivoltine & multivoltine seed cocoons its marketing and price fixation.

Unit - II: Model Grainage

2.1 **Establishment of grainages** - choice for site and grainage building plan.

2.2 Grainage equipments and their uses.

2.3 **Disinfection activities in grainages** - Significance, disinfection and hygiene.

2.4 Maintenance of grainage records.

Unit - III: Seed cocoon process

3.1 **Norms for procurement of seed cocoons** - sorting and preservation of seed cocoons.

3.2 **Methodology for sex separation at pupal stage** - preservation of pupa.

3.3 Moth emergence, synchronization, collection of moths, coupling and decoupling of moths and preservation of male moths.

3.4 **Moth examination** - Importance type of moth examinations (green & dry) an precautions.

Unit - IV: Silkworm egg handling

4.1 Preparation of loose and sheet eggs.

4.2 Surface disinfection washing and packing of eggs.

4.3 **Artificial hatching of hibernating eggs** - cold and hot acid treatment.

4.4 Egg preservation and hibernation schedules (3, 4 and 6 months).

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PRACTICALS:

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- Mot 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.*

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SEMESTER - II

PAPER CODE: SERI 202

SILKWORM REARING TECHNOLOGY - THEORY

Unit - I: 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 - II: 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 - III: 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 - IV: 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.

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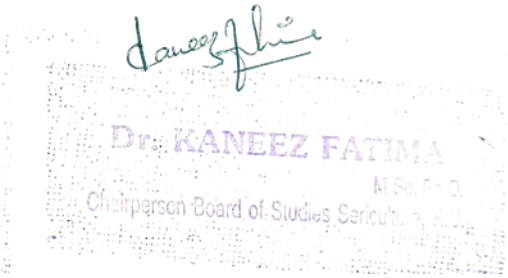
4.3 **Cocoon harvesting** - definition - time of harvesting - harvesting methods, defective cocoons - causes and types of defective cocoons, how to avoid defective cocoons, cocoon sorting, transportation - care to be taken while transporting and marketing of cocoons.

4.4 Rearing management to suite different seasons.

PRACTICALS

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



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SEMESTER - II

PAPER CODE: SERI 203

SILKWORM GENETICS AND BREEDING

Unit - I: Genetics of Silkworm

1.1 Hereditary traits in Bombyx mori-with reference to egg, larva pupa & moth.

1.2 **Linkage and crossing over** - Linkage groups and classical linkage map of Bombyx mori.

1.3 Maternal inheritance and voltanism in tropical and temperate races.

1.4 Inheritance of Cocoon Colouration

Unit - II:

2.1 **Mosaicism** - Types, nature and induction of mosaics.

2.2 **Parthenogenesis in Silk worm** - types and induction.

2.3 P**olyploidy** - Polyploidy in Breeding

2.4 **Mutation** - Radiation & Chemical Mutagenesis in Silkworm through specific locus test, dominant and autosomal recessive lethal genes and radiation sensitivity.

Unit - III: Silkworm Breeding

3.1 **Breeding methods** - Line in cross, selection and mutation breeding.

3.2 New approaches to bivoltine silkworm breeding their merits and demerits breeding plan.

3.3 Maintenance of germplasm bank and its importance in silkworm breeding.

3.4 **Selection parameters for breeding**-fixation of significant characters for improvement of silkworm races.

Unit - IV:

4.1 **Hybridization** - Polyhybrids, heterosis and hybrid Vigour. Exploitation of heterosis in Indian sericulture.

4.2 **Indian race authorization system** - commercial exploitation, authorised races/ hybrids of India.

4.3 Evaluation and authorisation of new races.

4.4 Maintenance & Multiplication of Silk worm breeds.

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PRACTICALS :

1. Racial characters of the silkworm, Bombyx mori'. Egg, larva, cocoon (pupa) and adult stages (univoltine, bivoltine and multivoltine).
2. Estimation of fecundity and hatching percentage in bivoltine and multivoltine races / breeds.
3. Mutants of Bombyx mori: Larval (Ursa, Zebra and Knobbed), eg; colour (pere), eye colour (white and red eye) and cocoon colour.
4. Study of adult life span (longevity) in Bombyx mori -multivoltine and bivoltine races / breeds and sexes.
5. Study of toxic symptoms in different stages of Bombyx mori.
6. Selection of cocoons for breeding and maintenance of breeding data.
7. Assessment of qualitative and quantitative traits of silkworm for breeding.
8. Calculation of inbreeding depression in silkworm.

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SEMESTER - II

PAPER CODE: SERI 204

DISEASES AND PESTS OF SILKWORM AND THEIR MANAGEMENT-THEORY

Unit - I: Basic concepts of silkworm diseases & Health problems

1.1 Introduction, classification of different types of Silkworm diseases.

1.2 Pathogenesis of diseases

1.3 Influence of environment & nutrition on the incidence of diseases.

1.4 Health problems related to sericulture.

Unit - II: Protozoan & Bacterial diseases.

2.1 **Protozoan diseases** - symptomalotogy, structure of Pebrine spore, life cycle of pebrine & sources.

2.2 Mode of infection & transmission prevention & control measures.

2.3 Bacterial diseases; causative agents, symptoms, factors influencing flacherio & source.

2.4 Mode of infection, transmission prevention & Control

Unit - III: Viral, fungal and aspergilles

3.1 **Viral diseases**: (NPV, CPV, Kenchu) causative agents, symptoms, factors influencing the disease source, mode of infection & Management

3.2 **Fungal diseases** - Causative agents, symptoms, factors influencing the diseases, sources mode of infection & management.

3.3 A**spergellus** - Causative agents, symptoms, factors influencing the diseases, sources mode of infection & Management.

3.4 Integrated silkworm diseases Management.

Unit - IV: Pests of Silkworms

4.1 Indian & Japan uzifly season occurrence, Ovipositor, nature & extent of damage, integrated management of uzifly.

4.2 Pests of silkworm; nature and extent of damage, life cycle, prevention & control measures, useful natural enemies of uziflies

4.3 Predators of silkworm; nature and extent of damage, prevention and control measures.

4.4 **Methods of pest control** - cultural, mechanical, physical, chemical, biological and **IPM, New strategies, use of Kairomones, Pheromonest growth regulators.**

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PRACTICALS :

1. Preparation of different recommended disinfectants.
2. Estimation of required quantity of disinfectants solution for different dimension of rearing houses & disinfection methods.
3. Demonstration of personal & rearing hygiene.
4. Identification of protozoan diseases & preparation of temporary slides of pebrine spore, staining of spres (yiemsa strains)
5. Identification of bacterial diseases isolation of preparation of temporary slid of bacteria & staining of bacteria.
6. Identification of viral diseases and preparation of temporary slide of NPS & CPV
7. Identification of fungal infected carva, pupae & moth and preparation of temporary slide of mycelia mat and spore of muscrdine.
8. Identification of biocontrol agent of uzifly & dermested beetles infested silkworm cocoons.
9. Methods of application of Silkworm old disinfectants.
10. Control methods of diseases.
11. Control methods of pests.
12. Determination & preparation of various concentration of various insect

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SECOND YEAR – SERICULTURE

SEMESTER – III

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SEMESTER – IV

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SEMESTER – III

PAPER CODE:SERI 301

COCOON PROCESSING 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 refiling, 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: Silk dyeing and printing.

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.

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4.3 **Raw silk grading-**International standards and bureau of International BIS.

4.4 Doubling, twisting, weaving, degumming, bleaching at d silk dyeing- objectives and

PRACTICALS:

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.

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

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Trotman, E.R. 1984. Dyeing and chemical Technology of Texttile fibers. John Wiley and sons, New York.

Venkatraman, K. 1971. The chemistry of synthetic dyes. Vol. I & II, Academic Press, London.

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SEMESTER – III

PAPER CODE: SERI 302

SILK TEXTILE TECHNOLOGY

Unit - I: Textile fibers & its types

1.1 **Introduction to textile fibers -** Classification, difference between natural and synthetic fibers.

1.2 Major and minor natural fibers.

1.3 Major and minor synthetic fibers.

1.4 Physical and chemical properties of silk and uses.

Unit - II: Silk Identification and throwing

2.1 Physical, Chemical, microscopic examination, flame test and solubility test.

2.2 Flame, test and solubility test for identification of natural and synthetic fibers.

2.3 **Silk throwing -** Objectives, types and methods, winding - doubling - twisting setting of twist, rewinding.

2.4 **Types of twisted Yarns -** Singles, organise, trans, crepe, noile, georgette, Blended yarns.

Unit - III: Silk weaving and wet processing

3.1 Preparation of weaving, different machineries employed in small scale and organised sectors, Handloom, Power loom and shuttle looms.

3.2 Weaving process and its mechanism. Application of computers in weaving and designing.

3.3 Introduction and objectives of degumming. Methods of degumming (hot water, extraction, Soap, Soap - soda, acids, amines), Degumming process.

3.4 Bleaching - Objectives, methods, process, whitening agents.

Unit - IV: Silk dyeing and printing.

4.1 Selection and application of dyes on silk methods of dyeing.

4.2 Identifying dyeing defects and computer colour matching.

4.3 **Silk fiber printing -** Objectives & Methods (block, screen, batik printing, roller & rotary printing).

4.4 **Silk finishing and care -** Objectives and methods permanent fabric care and labelling.

PRACTICALS:

1. Microscopic and physical properties of natural fibres.
2. Chemical properties of natural fibres
3. Microscopic and physical properties of manmade fibres.
4. Chemical properties of manmade fibres.
5. Types of yarns - staple and filament.
6. Samples of weave patterns.
7. Types of decorative fabrics.
8. Fabric dyeing.
9. Different types of printed fabrics.
10. Samples of consumer goods.
11. Fabric testing.
12. Care of fabrics.

REFERENCE BOOKS:

Gohl, E.P.G. and Vilensky, L.D. 1987. Textile science, CBS Publishers and Distributors, Delhi, India.

Grayson and Martin. 1984. Encyclopaedia of Textiles, fibers and Non woven fabrics, John Wiley and sons, New York.

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SEMESTER - III

PAPER CODE: SERI 303

(ELECTIVE SUBJECT-I)

SERICULTURE EXTENSION AND MANAGEMENT - THEORY

Unit - I: 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 - II: 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 - III: Sericulture extension - communication, motivation and Planning

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, theories and principles of motivation.

3.4 **Planning** - Importance of planning in extension organization.

Unit - IV: Sericulture extension program & planning

4.1 Farm management as a decision making process. Resources management and record maintenance.

4.2 Management of mulberry leaf production and its supply, management of rearing and grainages & cocoon and marketing.

4.3 **Management techniques in Silk industry** - Management of reeling units and human resource management.

4.4 Management in fabric production, finishing & marketing.

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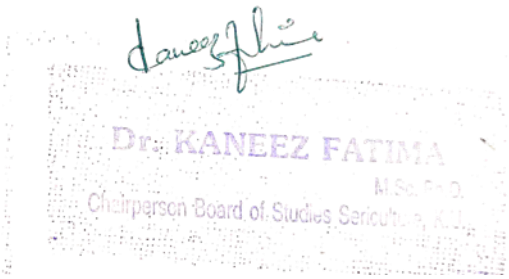

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SEMETER-III

PAPER CODE: SERI 303

(ELECTIVE SUBJECT -II)

SCIENCE OF SERICULTURE

UNIT-I General Sericulture

1.1 Introduction to textile fibres type, importance of silk fibres, identification of silk fibres.

1.2 Insects of non insects fauna producing silks, type of silk produced in India status of mulberry and non mulberry sericulture in India, sericulture's organisation in India.

1.3 Scope of sericulture in India vis-a-vis other crops, employment potential, income generation health hazards, sickness in small scale industries reasons – their remedial measures.

1.4 Grainage building, rearing house, reeling house equipment required for grainage, rearing, reeling disinfection of hygiene.

UNIT-II Mori culture

2.1 Most plants of mulberry and non mulberry silkworms, mulberry varieties and species.

2.2 Soils, types, problematic soils & their reclamation, climate and its impact on mulberry, propagation of mulberry.

2.3 Package of practices for mulberry cultivation under rainfed and irrigated condition.

2.4 **Pruning, harvesting, transportation & preservation of mulberry** leaves – Objectives & methods.

UNIT-III Grainage and rearing

3.1 Seed organisation model grainage, equipment, staff and labour maintenance.

3.2 **Grainage operation –** procurement of preservation of seed cocoons, sexing moth emergence, making oviposition – sheet & loose egg preparation, mother moth examination, surface sterilization of eggs, acid treatment of hibernating eggs, packing and sale of eggs.

3.3 **Rearing operations** Life cycle of silkworms transportation of Dfls, incubation of eggs, black boxing, environmental requirement, brushing, chawki and late – age rearing, feeding, cleaning, spacing, care during moult, mounting, spinning, harvesting, transportation, marketing and cocoon markets.

3.4 Pests and diseases of silkworms and their management

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UNIT-IV Reeling of By- products

4.1 Physical & commercial characteristic of cocoons, cocoons sorting cocoon stifling, cocoon cooking their objectives and methods.

4.2 Reeling, different reeling units – Charaka, cottage basin multi end, semi-automatic, automatic, re-reeling and packing – objectives of operation.

4.3 **Properties of mulberry silk, silk testing and grading –** objective, weaving, dyeing, prating of fabric finishing.

4.4 By products of sericulture industry of their utilisation (mulberry) rearing, grainage & silk reeling)

PRACTICALS:

1. Observation of difference stages in the life cycle of mulberry and non mulberry silkworm.
2. Observation of silkworm rearing activities.
3. Observation of grainage activities.
4. Observation of reeling activities .
5. Observation of pests of disease of mulberry of silkworm.
6. Observation of mulberry cultivation practise.

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SEMESTER - III

PAPER CODE: SERI 304

(ELECTIVE SUBJECT- III)

VALUE ADDITION IN SERICULTURE

Unit - I: Value addition from moriculture and rearing

1.1 **Value addition from Mulberry leaf -** Animal feed importance, Mulberry leaf extraction in reducing blood glucose & fail strengthening of blood vessels.

1.2 Usage in cosmetic production, health benefits of Mulberry leaves Tea & Soap.

1.3 **Value addition to Mulberry fruit -** Multipurpose uses of mulberry fruit, fruit jam and fruit chutney.

1.4 **Value addition products from mulberry stem**-Mulberry as fodder and fuel, wood art, utilisation of mulberry twigs for making of baskets, agricultural and sports items.

Unit - II:

2.1 **Recyling technology of sericulture waste -** preparation of compost from sericulture waste.

2.2 Silkworm litter for biogas generation.

2.3 Vermi composting of silk waste.

2.4 Livestock maintenance, Agriculture, Biogas slurry.

Unit - III: Value addition from Reeling and grainage

3.1 **Value addition from Silk worm -** commercial food.

3.2 **Value addition from Silkworm Pupae** - Cereal diet, use of Pupal Chitin, use of Pupal fat and oil, Pupae as boilers, ruminants and pigs diet.

3.3 Organic fertilisers as heath products of astronauts Pupal usage in Paints & Vanishes

3.4

Unit - IV:

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

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4.2 **Grainage waste and value addition** - utilisation of cut and pierced cocoon, Pharmaceutical industry, value addition to silk moth.

4.3 **Non mulberry sericulture waste utilization for value addition** -Tasar, muga and in waste-garland, silk paper, Silk package material, spun silk and noil silk, importance of quits.

4.4 Impact of value added by products a entrepreneurship.

REFERENCE BOOKS:

Kundu, S. (ed) (2004) Silk biomaterials for issue engineering and regenerative medicine, Elsevier.

Internet (Literature)

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SEMESTER –III

PAPER CODE: SERI 304

(ELECTIVE SUBJECT-IV)

SERI BIOCRAFT TECHNOLOGY

Unit - I: By products of Sericulture

1.1 **By-products of Mori culture -** unused leaves, pruned shoots.

1.2 **By - products of Rearing -** Litter as compost & animal feed, biogas plant and pharmaceutical industry.

1.3 **By-products of Grainage operations -** Cut cocoons - pierced cocoon, waste moths.

1.4 **By-products of reeling -** Cocoon waste, reeling waste, pupal waste, thread waste and its classification.

Unit - II: Basic concept of Bio craft

2.1 Introduction to bio craft and its importance.

2.2 Selection and processing of cocoons for making bio crafts.

2.3 Different tools for making bio crafts, sorting, Cleaning, dyes to be used for colouring (Natural & synthetic dyes) of cocoons.

2.4 Designing & developing of cocoon crafts.

Unit - III: Cocoon craft making

3.1 Hands on learning the skill and art of making single flowers, different forms of bouquets, garlands, placards, silk balls and cocoon caps.

3.2 Ikebans of cocoon craft flowers, flower arrangements in different materials (enamel, wood, plastic, glass, bamboo, porcelain and mud pots)

3.3 Making of photo frames, wall hangings, plates key chains, car hanging and greeting cards.

3.4 Interior decoration using cocoon crafts for different occasions, stage decoration of marriages and functions.

Unit - IV: Silk Craft making

4.1 Integration of agricultural / horticultural material in Silk craft as entrepreneurial skills.

4.2 **Indian race authorization system** - Commercial exploitation, authorized races/ hybrids of India.

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4.3 Utility of silk border/cloth/waste silk in making of purses, hand bags, vanity bags files, table clothes & Curtains etc.

4.4 Spun & nylon silk processing.

PRACTICALS:

1. Identification of different by-products.
2. Sorting & Selection of Cocoons.
3. Cleaning & dyeing methods.
4. Different tools for making of cocoon & silk bio crafts
5. Preparation of crafts from cocoons & silk waste.

REFERENCE BOOKS:

Internet & using creative wind.

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SEMESTER-IV

PAPER CODE: SERI 401

VANYA SERICULTURE

UNIT-I Basic concepts of Vanya Silk

1.1 **Vanya Silk in India -** Importance scope, demand.

1.2 Impact of Vanya Sericulture in tribal socio economic conditions & distribution.

1.3 Salient feature of the families of Vanya Silkworms

1.4 Host plants of Vanya Silkworms & its botanical description.

UNIT-II Most Plants of Morphology of Non-Mulberry Silkworms

2.1 Cultivation and package of practices for establishment of primary host plants.

2.2 Diseases & pests of host plants and their management.

2.3 Morphology of Vanya Silkworm (tasar, oak tasar, eri of muga)

2.4 Life cycle of tasar, eri of muga Silkworms.

UNIT-III Seed production Techniques in Vanya Silkworms.

3.1 Ecological condition that influence rearing of non mulberry silkworm.

3.2 Rearing of Vanya Silkworm traditional & improved technique

3.3 Muga culture and its endemic nature to Assam State.

3.4 Commercial egg production in Tasar, Eri, Muga silkworms & Seed organizations in Tasar, Eri and Muga Silkworm.

UNIT-IVReeling, Diseases of Pests of Non Mulberry Silkworms and host plant.

4.1 **Reeling of cocoons -** basic - difference between mulberry and non mulberry silk worker & different reeling machines - Traditional and modern reeling methods.

4.2 spinning: principles of cooking and spinning different method spinning of eri cocoons.

4.3 General account and common diseases of host plants of non mulberry silkworm of diseases of non mulberry silkworms - Protozoans, bacterial veral& fungal - causative agents, prevention of control measures.

4.4 **Pests and predators on Vanya silkworm** - Seasonal abundance, nature, extend of damage of various pests and predators & their control.

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PRACTICALS:

1. Most plants of tasar, eri& Muga silkworm
2. Identification of leaves of two food plants of non mulberry silkworm with morphological characters and taxonomic traits.
3. Identification of morphological features of tasar, eri, muga silkworm (egg, larva, pupa cocoon & moth)
4. Harvesting technology of Vanya silkworm including the rearing appliances.
5. Egg production technology of Vanya silkworm.
6. Cooking & reeling technology of tasar.
7. Cooking & Spinning technology of eri cocoons.
8. Identification of tasar, eri&muga saw silk yarns & wastes.
9. Pests and diseases of Vanya silkworms.
10. Predators of Vanya Silkworms.

REFERENCE BOOKS:

1. Jolly M.S., Sen, S.K. Sanwallen N and Prasad G.K. (1997) Sericulture manual 4 - Non mulberry silks, food & Agricultural services butteteen 15/4 Food and agricultural organisation of the United Nations, Rome.
2. PonnaSrinvias&Kuntamalla Sujatha (2020), III year Zoology (Sericulture) Telugu academic, Hyderabad.
3. Chowdhury S.N. (1998), Muga Culture, Central Silk Board, Bangalore, India.
4. Dokuhow, S.N. (1998) Muga culture, Central Silk Board, Bangalore, India.
5. Jolly, M.S. Chowdhury, S.N. and Sen (1975) Non Mulberry Sericulture in India, Central Silk Board, Bombay, India.
6. Jolly, M.S. (1998) Tasar Culture, Central Silk Board, Bangalore.
7. Thangavellu, K; Chakraborty, A.K. Bhagawati, A.K. ISA MA (1998) Hand book of Eri culture, CSB, Bangalore.
8. Choudury, S.N. (1982) Eri Silk Industry, Direction of Sericulture & weaving, Govt. of Assam, Gaubati, Assam.
9. Sarkar, D.C. (1998) Eri culture, Central Silk Board, Bangalore.

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SEMESTER - IV

PAPER CODE: SERI 402

FUNDAMENTAL OF COMPUTER SCIENCE

Unit - I: Basics of Information Technology & Networking

1.1 Characteristics of computers, communication technologies.

1.2 Computer system and computer languages.

1.3 **Computer Network -** Types of network and technology.

1.4 Cloud computing, multimedia, chat and social networks.

Unit - II: Operating systems & cyber safety.

2.1 Functions and types of operating systems, commonly used operating systems.

2.2 Mobile operating systems, Kernel, Device Drivers and file systems.

2.3 Introduction to window 10 and file explorer.

2.4 **Cyber safety -** Safety browsing the web and using social networks, safety accessing websites.

Unit - III: Editing and formatting in word processor

3.1 Editing and formatting of document, paragraph formatting.

3.2 Bullets and numbering, inserting pictures.

3.3 Creating modifying and formatting table.

3.4 Role and use of computer in sericulture.

Unit - IV: Presentation soft ware& spread sheet

4.1 Inserting slides in presentation, slide show and creating and customizing slide master.

4.2 Inserting pictures and shapes, slide transitions and Animations.

4.3 **Spread sheet -** advantages of spread sheet, entering Data, editing cell contents formatting excel worksheet.

4.4 Formulas in Excel

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PRACTICALS:

1. MS-DOS commands.
2. Windows and its applications.
3. MS Word and its applications.
4. MS Excel and its application.
5. MS Power Point and its applications.
6. Antivirus and its applications.
7. Internet - browsing, surfing, e-mail and chat.
8. Uses and applications of computers in sericulture.
9. Applications of measures of central tendency.
10. Diagrammatic representation of data - bar, pie and histograms.
11. Analysis of data though Student 't' and Chi square tests.
12. Record of observations on mulberry - growth, yield and quality parameters.
13. Record of observations on silkworm - rearing, cocoon and grainage parameters.
14. Analysis of data through CRD and RCBD.
15. Analysis of data through LSD and factorial experiments.
16. A consolidated report shall be submitted at the end of the course for evaluation towards C-2 component.

REFERENCE BOOKS:

Attwood, T.K (1997) Explaining the language of Bioinformatics. In Oxford Dictionary of Biochemistry and Molec Biology, Stanbury, H. (ed). Oxford University Press.

Baldi, P. and Brunk, S. (1998). Bioinformatics: The Machine Learning Approach (Adaptive computation and macl Learning). MIT Press.

Baxevanis, A and Ouellette, B.F.F. Eds. (1998). Bioinformatics: A Practical Guide to the Analysis of Genes Proteins. John Wiley and Sons.

Brown, T.A (1994) DNA Sequencing).IRL Press, Oxford.

Setubal, J.C and Meidanis, J. (1997) Introduction to Computational Molecular Biology. PWS Publishing Company.

Swindoll, S.R., Miller, R.R. and Myers, G.S.A. (1996) Internet for the Molecular Biologists. Horizon Scientific Press

Walterman, M.S (1995) Introduction to Computational Biology: Maps, Sequences and Genomes. Chapman and Hall.

Wen-Hsiung, L. and Graur, D (1991) Fundamentals of Molecular Evolution. Sinauer Associates, Inc.

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SEMESTER-IV

PAPER CODE: SERI 403

(SUBJECT ELECTIVE- I)

SERICULTURE AND ENTREPRENEURIAL DEVELOPMENT – THEORY

UNIT-I Entrepreneurship and EDP

1.1 Concept & Characteristic features of entrepreneurship.

1.2 Elements, trails and functions of entrepreneurship.

1.3 Factors contributing to women entrepreneurship.

1.4 **Entrepreneurship essentials –** Mobilizing resources to start up and start up problems.

UNIT-II Entrepreneurship development programme (EDP)

2.1 Need, objectives and phases of EDP.

2.2 Women EDP in sericulture.

2.3 Importance of EDP in textiles and dress designing.

2.4 **Role of Government in developing entrepreneurship –** Institutions at national and state level.

UNIT-III Scope of Entrepreneurship in Sericulture.

3.1 Precocoon activity, kisan nursery, vermicompost, 1310 fertilizers and biogas.

3.2 Entrepreneurship in silkworm egg production.

3.3 **Entrepreneurship in rearing** – Chawki rearing units ,mass disinfection units, polyclinics and production of bio – control units.

3.4 Renting of implements and mountages. Cocoon collection and transportation to the market.

UNIT-IV Entrepreneurship in reeling units.

4.1 Maintenance of quality cocoons and its preservation.

4.2 Entrepreneurship in silk reeling and establishment of reeling units.

4.3 **Post cocoon activity** – Reeling, twisting, wearing, printing, Dyeing and computer aided designing.

4.4 Entrepreneurship in by – products utilization.

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REFERENCE BOOKS:

1. Ganga, G and J Sulochanachetty (1991) an introduction to sericulture :*Oxford & IBM publishing company, (both editions)*
2. Manuals & silkworm rearing agriculture service bulletin, FAO, *Rome*
3. Bibhide Nath Jha (2012) Silk industry in India, *Satyam publishing house, New Delhi.*
4. Somasekhar, TM & Kawa Kami, Eds (2002) Manual on Bivoltine silk reeling Technology, *BST Project CSRTI, Mysore.*
5. Muang guo Rui (1998) Silk reeling – *Oxford & IBM publishing Co, Pvt, Ltd.*
6. Govindaiah Gupta VP D Rajadurai, S.Nishetha Naik (2005) a text book on mulberry crop protection, C*entral silk board, Bangalore.*

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SEMESTER-IV

PAPER CODE: SERI 403

(ELECTIVE SUBJECT-II)

ECONOMICS OF SERICULTURE

UNIT-I Basic concepts of economics

1.1 Principles of economics, micro and macro economics.

1.2 **Costs concepts in sericulture practices** - Average cost, marginal costs, fixed cost, variable cost.

1.3 Explicit cost, Implicit cost and opportunity cost.

1.4 Profit-Gross and net. Break even analysis.

UNIT-II Economics of mulberry cultivation and Silk worm rearing

2.1 Economics of mulberry production under rainfed and irrigated conditions.

2.2 Leaf-Cocoon ratio, cost benefit ratio of sericulture practices in traditional and modern practices.

2.3 Economics of seed production.

2.4 Significance of sericulture in creating employment and income in rural areas.

UNIT-III Economic of Silk Production.

3.1 Comparative economics in Chanka, Cottage basin and multi - end basin.

3.2 Recent trends in Silk production from economic point of view

3.3 Economics of Silk reeling units.

3.4 Economic viability of filature in public sector units of Telangana State.

UNIT-IV Economics of Silk wearing and intercropping.

4.1 Comparative economics between handloom and power loom.

4.2 Economics of tasar Eri and muge silk weaving and finishing.

4.3 Mixed crop system in sericulture-Integration of sericulture with allied industries (agriculture, horticulture, poultry fish farming and pharmaceuticals)

4.4 Policies involved to augment the Indian Silk export impact of Globlisation of silk industry.

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PRACTICALS:

1. Estimation of bleaching loss in multi voltine silk.
2. Study of different types of silk wastes.
3. Visit to silk reeling establishment.
4. Visit to filed and formers rearing house to study sericulture technologies adopted.

REFERENCE BOOKS:

1. Rajapurohit and Govindaraju (1980), Employment generation in Sericulture, Ashish Publication, New Delhi.
2. Aziz, A. and Hanumappa, H.G. (1985), Silk Industry - Problems and prospects, Ashish Publication, New Delhi.
3. Hanumappa, H.G. (1986), Sericulture for rural development.
4. Gopal (1991), Demand and supply prospects for high quality raw silk, Oxford & IBH
5. Ramanna, D.V. (1992) Economics of Sericulture and Silk Industry, Deep & Deep Publication, New Delhi.
6. Changappa (1994), Strategies for export of Indian Silk in the changing environment in Global Silk Scenario-2001, Oxford and IBH.
7. Hanumappa, H.G. (1993), Sericulture Society and Economy, Ashish Publishing House, New Delhi.

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SEMESTER-IV

PAPER CODE: SERI 404

(ELECTIVE SUBJECT-III)

WOMEN EMPOWERMENT IN SERICULTURE

UNIT-I Women work and Empowerment

1.1 Productive and unproductive work, participation of women in production process of Sericulture activities.

1.2 Women role in mulberry cultivation, silkworm rearing, grainage operation and reeling sector.

1.3 Role of Semi culture in empowering women via stainable livelihood security.

1.4 **Tassar Culture** –A powerful tool for empowerment of tribal women.

UNIT-II Role of state in capacity building of women sericulturist.

2.1 Govt. Schemes for empowerment of women.

2.2 Sericulture industry a source of employment generation for ruler women.

2.3 **Institutional finance** – micro credit and credit support.

2.4 Women development programmes for cultural barriers.

UNIT-III Problems of women Sericulturist.

3.1 Challenge and opportunities for women in small scale industry startups.

3.2 Health hazards in various sericulture activities and their impact on women empowerment.

3.3 Gender equality and women empowerment.

3.4 Socio –economic condition of women as sericulture labour in Telangana.

UNIT-IV

4.1 Women empowerment through sericulture entrepreneurship.

4.2 Remedies for empowering women in Sericulture.

4.3 Empowerment of disability through sericulture.

4.4 Role of information and technology for women empowerment in sericulture.

REFERENCES:

1. Kothari Jay (1995), Women and Empowerment. Gjan Publishing House, New Delhi.
2. Sangeetha Purushotham (1998). The Empowerment of Women in India, Sage Publication, New Delhi.
3. Surhma Sahay (1998) Women and Empowerment Approaches and Strategies, Discovery Publishing House, New Delhi.

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SEMESTER-IV

PAPER CODE: 404

(ELECTIVE SUBJECT-IV)

SERICULTURE – BIODIVERSITY & BIOTECHNOLOGY

UNIT-I Importance of Bio-diversity

1.1 Host plant genetic resources (mulberry & non mulberry).

1.2 Geographical diversity and gene centres. Morphological diversity.

1.3 Silkworm genetic resources (mulberry and non mulberry silk worms).

1.4 Seri – biodiversity in Telangana, loss of seri – biodiversity.

UNIT-II Conservation of Seri biodiversity

2.1 Seri biodiversity - An important approach to improve quality of life.

2.2 Silkworm germplasm conservation strategy and sustainable development.

2.3 Importance of seri biodiversity and forest conservation.

2.4 Objectives and advantages of seri biodiversity conservation.

UNIT-III Importance of biotechnology

3.1 Scope & importance of plant biotechnology in sericulture.

3.2 Transgenic plants & their role in crop improvement, molecular farming and regulated gene expression.

3.3 Insect advantages and disadvantages. Culturing procedures.

3.4 **Polymerase chain reaction cell and tissue culture** – (PCR) – Gene amplification, application of PCR in silkworm biotechnology.

UNIT-IV Application of Bio Technology

4.1 Application of bio technology in silkworm - new textile fibres, improvement of silkworm strained and maker assisted breeding.

4.2 Characteristics of thermo tolerant breeds.

4.3 Identification of antimicrobial proteins.

4.4 **Recombinant DNA technology** – Cloning vectors for re combinant DNA, cloning and expression of vectors.

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PRACTICALS:

1. Estimation of protein in mulberry leaf.
2. Separation and identification of amino acids by Chromatography.
3. Procedure for sterilization and preparation of culture media.
4. Media preparation for silkworm cell lines.
5. Selection of tissue for establishment of silkworm cell line.

REFERENCES:

1. Sericulture and seri-biodiversity – P.K. Srivastav and K. Thangavelu.
2. Genetic engineering in plaits. Ko suge T. Meredith, C.P and Hollender S. Plenum press, New York, 1989.
3. Plaint biotechnology Ignacimuthu V.L. Oxford IBH publishing company, New Delhi, 1995.
4. Genetic manipulation for crop improvement. Chopra V.L. Oxford IBH publishing company, New Delhi, 1985.
5. Plant biotechnology in Agriculture by K. Lindsey and M.G.K. Jones prentice hall Jersey, 1990.

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Pattern of Question paper

M.SC. SERICULTURE (I,II, III& IV SEMESTERS) EXAMINATION

PAPER -

(Paper Title)

Time: 3Hours **Max. marks 80**

Section - A (Marks: 4 x 5 = 20)

I. Answer the following questions

a)

b)

c)

d)

Section - B (Marks: 4 x 15 = 60)

Answer **ALL** question

2. a)

OR

b)

OR

3. a)

OR

b)

OR

4. a)

OR

b)

OR

5. a)

OR

b)

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CBCS PATTERN IN SEMESTER SYSTEM WITH EFFECT FROM 2023-24

SCHEME OF PRACTICAL QUESTION PAPER

Time: 3Hours **100 Marks**

1.	Major experimental	35 Marks
2.	Minor Experiments	25 Marks
3.	Sporting	6 x 5 = 30marks
A.		
B.		
C.		
D.		
E.		
4.	Record	5 Marks
5.	Viva Voice	5 Marks

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SEMESTER - IV

PROJECT WORK

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.

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