University of Jammu, Jammu 180 006

SERICULTURE
SEMESTER- III
EXAMINATION TO BE HELD IN THE YEARS 2017, 2018 2019
UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETC301

Credit: 04
Course Title: Diseases and Pests of Silkworm and Mulberry

Duration: 2½ Hours

Maximum Marks: 100
Theory Examination: 80
Internal Assessment: 20

There shall be a Semester End Examination for theory of 100 marks and practical paper of 50 marks. Theory and practical papers shall be of three hours duration each.20% of marks shall be reserved for internal assessment in theory paper and 50% in practical paper. Semester End Examination for Theory paper will be set for 80 marks and final practical paper for 25 marks. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

UNIT-I

1.1 Introduction and classification of different types of silkworm diseases.
1.2 Influence of environment and nutrition on the incidence of diseases.
1.3 **Protozoan diseases**
- 1.3.1 . Pebrine-Symptomology, Source and mode of infection, prevention control measures.
- 1.3.2 Structure and life history of Nosema bombycis

1.4 **Bacterial diseases**
- 1.4.1 Flacherie-symptoms of different type of Flacherie diseases.
- 1.4.2 . Causative agents and factors influencing Flacherie.
- 1.4.3 Sources, mode of infection, prevention and control measure of Flacherie.

UNIT-II

2.1 **Viral diseases**
- 2.1.1 Grasserie-symptoms of different types of Grasserie disease and causative agents.
- 2.1.2. Sources and mode of infection of Grasserie.
- 2.1.3 Prevention and control measures of Grasserie.

2.2. **Fungal diseases**
- 2.2.1. Muscardine-Symptoms of different types of Muscardine with Special reference to Beuveria.
- 2.2.2. Mode of infection, prevention and control measures of Beuveria Muscardine. .

2.3. General account of disinfection and the efficacy of different disinfectants.

UNIT –III

3.1. Classification and survey of mulberry diseases.

3.2 Influence of biotic and abiotic factors on the incidence of mulberry diseases.

3.3. Fungal diseases of mulberry; occurrence, symptoms, epidimology and control measures of the following diseases.

- 3.3.1 Leaf spot.
- 3.3.2 Leaf rust.
- 3.3.3 Leaf Powdery mildew.
- 3.3.4 Leaf blight.

3.4 Minor diseases of mulberry; Twig blight, root rot, Root knot, Trunk rot and stem canker, their occurrence, symptoms and control measures.

UNIT-IV

4.1 Bacterial diseases-Symptoms and control measures of the diseases caused by the following bacteria:

- 4.1.1 Bacterium moriculum.
- 4.1.2 B. mori.
- 4.1.3 B. cubonianus.

4.2 Viral diseases-symptoms, causative agents, prevention and control measures of the following viral diseases:

- 4.2.1 Dwarf disease,
- 4.2.2 Mosaic disease.

4.3 Mineral deficiency symptoms in mulberry and reclamation.

UNIT -V

5.1 Introduction

- 5.1.1. Definition of pests, parasitoids and predators.
- 5.1.2. Sampling methods of pests- economic injury level, economic threshold.

5.2 Pests of Silkworm:

- 5.2.1 Life cycle, nature of damage, prevention and control measures of Techinid (Uzi) fly.
- 5.2.2. Nature of damage, prevention and control of Dermestids, ants, rodents and lizards.

5.3 Mulberry pests- with special reference to Jammu region of J&K State.

- 5.3.1 . Life cycles, symptom of attack, period of occurrence, mode and extent of damage and control measures of the following pests:
- 5.3.1.1 Borers, girdlers-with special emphasis on *Batocera rufomaculata*.
- 5.3.1.1 Defoliators Caterpillars-with special emphasis on *Spodoptera litura* and *Diacrisia obliqua*.

5.4. Mode and extent of damage and control measures of the following pests:

- 5.4.1 Grasshoppers, Jassids.
- 5.4.2 Suckers-Mealy bugs, Scale Insects, Thrips and Mites.
- 5.4.3 Termites.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

The internal assessment under Choice Based Credit System shall be of 1 hour duration and shall comprise of two parts.

Part A: Total weightage of Part A will be 10 marks and shall comprise of 8 short questions selecting atleast from 2 to 3 units (50% of syllabus covered).A candidate will have to attend any 5 questions each carrying 2 marks.

Part-B: Total weightage of Part-B will be 10 marks and shall comprise of 2 long answer questions from first 2 to 3 units. A Candidate will have to attempt only 1 question of 10 marks.

Note 2: For paper setters :External End Semester University Examination

The External examinations in theory shall consist of the 3 sections.

Section A: Section-A shall be of 15 marks and will comprise of 5 short answer type questions, one from each of the units and carrying 3 marks each. Answers should be precise having 70 to 80 words only and without any detailed explanation (**All Compulsory**).

Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

Section C: Total weightage of Section-C shall be 30 marks and will comprise of 5 long answer type questions, one from each of the units. A candidate will have to attempt only 2 questions from all the questions and will carry 15 marks each. Answers should be of 500 to 600 words with detailed analysis/explanation/critical evaluation to the question.

BOOKS RECOMMENDED

1. Kiraly, Z *et al.* (1974). Methods in plant pathology with special reference to breeding for disease resistance (Eds.) Kiraly, J. Elsevier Sci., Publ. Co., New York.
2. Vender Plank, J .E. (1968), Disease resistance in plants. Academic Press, New York. –
3. FAO Manual-Mulberry cultivation, FAO, Rome
4. Text book of tropical sericulture -1975. Japan Overseas corporation volunteers 4-2-24, Hroo Sibuya, KU, Tokyo, Japan.
5. Sturnikov, V.A. (1976). Control of silkworm development and sex, MIR Publ. Moscow.
6. Tazima, Y. (1978). The silkworm : An important Laboratory Tool. Kodansha Ltd. Tokyo.
7. Yokoyama, T. (1954). Synthesized science of sericulture, USA Publ., Bombay.
8. Manual on Sericulture: Food and Agriculture Organization Rome, 1970.
9. Appropriate Sericultural Techniques Ed. By M.S. Jolly.
10. Handbook of Practical Sericulture, S.M.Ullal and M.N.Narasimhanna, CSE, Banglore, 1987
11. Text Book of Tropical Sericulture, Pub. Japan. Overseas Corporation Volunteers, 1970. ,
12. Handbook on Silkworm Rearing; Agriculture and Technical Manual-I, Fizi Pub. Co. Ltd. Japan, 1972.
13. Manual on Silkworm egg production: M.N.Narasimhanna, Pub. By CSE, Bangalore, .1988.
14. Silkworm rearing: Wapan-Chun and Chan Da-chung, Pub, by FAD, Rome, 1988.
15. A Guide for bilvoltine sericulture, R.Sengupta, Director, CSE & II, "Mysore, 1989.
16. New Technology of Silkworm Rearing: ,S.Krishnaswamy, Reprinted by CSB, Banagalore, 1980. .
17. Improved method of rearing young age silkworm S.Krishnaswamy, Reprinted by CSE: Bangalore, 1980.
18. The Principles of Insect Physiology: V.B.Wiggiesworth Pub. By English Language Book Soc., Chapman and hall, 1972.
19. Economics of Sericulture under irrigated conditions, M.S. Jolly, CSR &TI, Mysore-8, 1982
20. Economics of Sericulture under rained conditions, M.S.Jolly, CSR & II, Mysore;.1982.
21. The Silkworms an important laboratory tool, ed. By Tazima, Kodansna, Japan.

22. Silk from gruo to glamour: Mahesh M.Nanavarth, Pub. In Inian Paramount House, Bombay, 1965.
23. Principles of Insect Morphology : R.G. Snodgrass, Tata McGraw Hill Pub. Co. Ltd. Bombay, 1965.
24 Insect Biology in the future, ed. By Michael Locke, David S. Smith, Academic Press, 1988
25. Silkworm Biology and Rearing, KK Dhola, Project Coordinator, NCERT, New Delhi, 1990.
26. An Introduction to Sericulture, Ganga G. and J. Sulochana Shetty Oxford and LSN Pub. 1991.
27. China Sericulture, 1972, FAO, Rome.
28. Silkworm Rearing and Diseases of Silkworm, 1950. Ptd. By Director of Ptg., Stn, and Pub. Govt. Press Banglore.
29. Choe Byong Hoe 1972; Sericulture Technology, Ptd. By Seoul National University, Press, Korea.
30. Silkworm Rearing Techniques in Tropics, Seinosuka Omua, 1973; OTC, Tokyo .Japan:
31. Sericology, Tanaka, Y 1964, CS8 Pub, Bangalore
32. Synthesized Science of Sericulture, Yokoyama, 1954. Pu6. With permission of .Sugimanika, Tokyo. 1
33. Handbook of Sericulture-1 Yonemua, M and Rama Rao, M. Mysore Govt. Ptg. Press.

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SERICULTURE

SEMESTER-III

Course No. USEPC302 **Credit: 02**

Course Title: Practical

Duration: 2½ **Hours** **Maximum Marks: 50**

External: 25

Internal: 25

Diseases of Silk Worm

1. Morphological features of Pebrine infected eggs, larvae, pupae and moths
2. Morphological features in larvae-infected by different bacteria and viruses.
3. Examination of larvae, Pupae and moth infected with fungal diseases.
4. Practical knowledge of various chemicals used to control silkworm diseases &method of applications.

Diseases of Mulberry

5. Collection of diseased samples and their preservation.
6. Identification of root knot disease, root galls, egg-masses, larvae and nematodes.
7. Preparation of fungicide formulations.
8. Collection, mounting/preservation of insects from mulberry garden and silkworm rearing house, grainage, reeling units.
9. Identification of local pests of mulberry.
10. Identification of pests of silkworm.
11. Identification of developmental stages of pests of mulberry with special reference to caterpillars, borers and defoliators.
12. Identification of the symptoms of pest (mulberry) attack.
13. Identifications of symptoms of pest (silkworm) attack.
14. Field visit to mulberry garden to assess the incidence of pests and the types of damage caused by them, application/demonstration of prevention and control measures.
15. Commercial characters of mulberry- some evolved varieties.

Distribution of 25 marks of Internal Assessment Practicals under CBCS

1. Daily evaluation of Practical records and Internal Practical Test: **15 Marks**
   Marks obtained on the basis of day to day performance
   in the lab/field =**08 marks**
   Further distribution of marks on the basis of grades:
   α = 9/10
   β = 7/10
   γ = 5/10
   To be converted out of 08 marks.
   Internal Practical Test= **07 Marks**
2. Marks of Attendance : **05 Marks**
   Distribution:
   <75% = 0 marks
   75%-80% = 6 marks
   81- 90% = 8 marks
   91%-100% = 10 marks
3. Viva-voce : **05 Marks**

Total=25 marks

SERICULTURE
SEMESTER- III
EXAMINATION TO BE HELD IN THE YEARS 2017, 2018 2019
UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETS303 Credit: 04

Course Title: Mulberry Production Technology

Duration: 2½ Hours Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There will be one written theory paper of 100 marks. University Semester End Examination will be set for 80 marks (80%) of three hours duration and 20% of marks shall be reserved for internal assessment. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

Unit- I

1.1 Taxonomy of mulberry, different varieties of mulberry with special reference to J & K.
1.2 Morphology of mulberry i.e. stem, root and leaf.
1.3 Economic importance of mulberry.
1.4 Essential elements required for mulberry growth and their types.
1.5 Soil analysis-soil sampling, soil pH.
1.6 Importance of soils with reference to mulberry cultivation.

Unit-II

2.1 Propagation of mulberry- Sexual propagation - raising of seedling.
2.2 Asexual propagation - raising of saplings, cuttings, grafting and layering.
2.3 Planting System- Row system; Spacing for mulberry and its significance.
2.4 Plant growth regulators: Importance and application in mulberry.

Unit-III

3.1 Establishment of mulberry garden under rain-fed and irrigated conditions:
(a) Planting season.
(b) Selection and preparation of land.
(d) Selection and preparation of planting material.
(e) Initial harvesting.
(f) Chawki garden; importance and maintenance.
(g) Late age garden; importance and maintenance.
3.2 Manures and fertilizers: Types, dosage, application and schedule.
3.3 Irrigation: Source, methods- flood, furrow, basin, sprinkler and drip.

Unit-IV

4.1 Pruning and training methods and their importance.
4.2 Weeds of mulberry garden: weeding and intercultural operations.

4.3 Inter cultivation practices: Purpose, methods, time and frequency; mulching.
4.4 Leaf harvesting: Effects of harvest on mulberry plant; harvesting methods (leaf and shoot harvests); transportation and preservation of harvested leaf and shoot.
4.5 Estimation of leaf yield: Importance of leaf quality.

Unit-V

5.1 Introduction to plant diseases and importance of plant protection.
5.2 Major diseases of mulberry; Leaf spot, Leaf rust, Leaf Powdery mildew and Leaf blight, their occurrence, symptoms, and control measures.
5.3 Minor diseases of mulberry; Twig blight, root rot, Root knot, Trunk rot and Stem canker, their occurrence, symptoms and control measures.
5.4 Pests of mulberry: Stem borer, Bihar hairy caterpillar, mealy bug, termites and Thrips – occurrence, their preventive and control measures.
5.5 Mineral deficiency symptoms in mulberry.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

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Note 2: For paper setters :External End Semester University Examination

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Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

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2. Sericology By Tanaka, Y.Pub., C.S. B-964.

3. Text Book of Tropical Sericulture, Publ. Japan, Overseas Corporation Volunteers-1975.
4. Silk-A Survey of International Trends in Production and Trade (international) Trade Centre UNO TAD/GATT. Developed Countries and Developing Countries.
5. Regional Sericulture Training Centre, Guangzhon, China.
6. FAO Manuals on

(i) Mulberry Cultivation

5. Bibliography of the Technical Literature on silk by F.O.HOWITT.
6. Culture and sericulture by Prof. S.R.Charsnly.
7. Sericulture for Rural Development Edited by M.B.Hanumappa.
8. The Development of Indian Silk, Sanjay Sinha, 1990.
9. Sericulture by N,G. Mukerji, 1912.
10. Silk by H.T. Gaddum and Company Ltd. Macchs Field, Chestrin.
11. Silk Reeling Techniques in the Tropics by Japan International Cooperation Agency, Tokyo. Japan, 1981.
12. Silk Biology, Chemistry Technology by Dr. Paolo Carooni, 1952.
13. Sericulture Technology, By Choel Byong Hee, Seoul Natl. Uni. Press Korea, 1972.
14. Sericulture Manual-I (Mulberry cultivation)1972.
15. Jaisawal, P.L.1980, Hand Book of agriculture, India. Indian Council of Agriculture Research New Delhi.
16. Kvamer (Paul J.) 1969; Plant and Soil Water relationship: Modern Synthesis. York McGraw Hill.
17. Krishna Moorthy, H.N., 1975, Gibberellins and Plant Growth, Wiley Eastern, .Delhi.
18. The Nature and Properties of Soils (9th edition) N.C.Brady (MacMillion, Publications Co. Inc., New York).
19. Studies on Soils of India, S.V. Govinda Rajan and H.G.Gopala Rao *(*1970*),* Vikas Publ. House Pvt. Ltd. New Delhi/Bombay.
20. Text Book of Soil Sciences (underprint), T.D.Biswas and S.K.Mukherjee (1990) Tata Mc Graw Hill Publication, Co. Ltd. New Delhi.

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SERICULTURE

SEMESTER- IV

EXAMINATION TO BE HELD IN THE YEARS MAY 2018, 2019 2020

UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETC401 Credit: 04

Course Title: Genetics and Breeding of Silkworm and Mulberry

Duration: 2½ Hours Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There shall be a Semester End Examination for theory of 100 marks and practical paper of 50 marks. Theory and practical papers shall be of three hours duration each.20% of marks shall be reserved for internal assessment in theory paper and 50% in practical paper. Semester End Examination for Theory paper will be set for 80 marks and final practical paper for 25 marks. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

UNIT-I

1.1 Genetic variability in mulberry sources of variability.

1.2. Popular varieties of Mulberry in India with introduction to Japanese China and Russian varieties.

1.3 Germ plasm conservation, significance and methods.

1.4 Functions of plant genetic resource centres.

UNIT-II

2.1 General introduction to plant breeding:

- 2.1.1 Determination of mode of reproduction in mulberry
- 2.1.2 Method of plant breeding.
- 2.1.3 Choice of method of breeding

2.2 Objectives of mulberry breeding:

- 2.2.1. Parameters associate with growth, yield and quality of mulberry.
- 2.2.2 Breeding for disease and pest resistance, breeding for stress conditions like salinity and alkanity.

2.3 Pure-line selection

- 2:3.1 Characters of importance of pure lines.
- 2.3.2: Applications of pureline in mulberry.

2.4 Clonel selection-characters of clone.

- 2.4.1. Source of clonal variation in mulberry.
- 2.4.2 Procedure of clonal selection, characters and achievements.

UNIT-III

3.1 Polyploidy breeding:

- 3.1.1 Occurrence and classification of polyploids.

3.1.2 Effects of polyploidy.
3.1.3. Production of haploid, triploids, and tetraploids in mulberry.

3.2 Hybridization-application and objectives:
3.2.1 Procedure of hybridization in mulberry.
3.2.2. Heterosis.
3.2.3 Selection in F1 progeny.
3.2.4. Advantages, limitations, scope and achievements of hybridization.

3.3. Role of tissue culture in the improvement of mulberry

3.4. Mutation:
3.4.1 Induction of mutation through radiation and chemical mutagens. Economic utility of induced mutants.

UNIT -IV

4.1 Silkworm as a laboratory tool for genetics studies.

4.2 Heredity and environment:
4.2.1 Genotype and Phenotype.
4.2.2 Heredity and variation.
4.2.3 Distinguishing hereditary and environmental variations.
4.2.4 Pure lines and in bred lines.
4.2.5 Hereditary traits and effects of environment on-Egg, larva, Cocoon, pupa and adult characters.

4.3. Inheritance of cocoon colour, larval marking, multiple alleles.

4.4 Inheritance of voltinism, multivoltinism Environmental influence and hormonal control.

4.5 Sex determination, sex linked, sex limited traits and their special significance in sericulture. Prospects of bio technology to improve silk production.

4.6 Mutation:
4.6.1 Induction of mutation through radiation and chemical mutagens.
4.6.2 Radiation sensitivity in different developmental stages.
4.6.3 Economic utility of induced mutants.

4.7 Prospects of bio technology to improve silk production.

UNIT V

5.1 Origin, distribution and differentiation of silkworm races; Japanese, Chinese, European, South East Asian and Indian races and their characters.

5.2 Present status of silkworm breeding in India.

5.3 Breeding of silkworm: pre-requisites, aims and objectives.

5.4 Selection methods: individual and family selection. Heterosis and combining ability in silkworm.

5.5 Inbreeding and outbreeding: Princples, advantages and disadvantages.

5.6 Development of Auto sexing silkworm breeds for egg colour, larval marking and cocoon colour; sex ratio in normal and sex limited breeds; and economic advantages of the hybrid preparation and need of the farmers.

5.7 Heterosis and combining ability in silkworm.
5.7.1. Hybrid vigour in different crossing systems.
5.7.2 Theoretical basis of Heterosis.
5.7.3 Utilization-of Heterosis in Sericulture.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

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4. Text Book of Tropical Sericulture, Pub. Japan. Overseas Corporation Volunteers, 1970.
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9. New Technology of Silkworm Rearing: S.Krishnaswamy, Reprinted by CSB, Bangalore, 1980.
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11. The Principles of Insect Physiology: V.B.Wiggiesworth Pub. By English Language Book. Soc. Chapman and hall, 1972.
12. Economics of Sericulture under irrigated conditions, M.S.Jolly, CSR & II, Mysore 1982.
13. Economics of Sericulture under rained conditions, M,S.Jolly, CSR & 11, Mysore 1982.
14. The Silkworms are important laboratory tool, ed. By Tazima, Kodansna, Japan.

15 Silk from gruo to glamour: Mahesh M. Nanavarth, Pub. In Indian Paramount House, Bombay, 1965.
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26. Handbook of Sericulture-1 Yonemua, M and Rama Rao, M. Mysore Govt. Ptg, Press.
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28. Ayyar, I.V.R. (1987) Hand Book of Economic entomology for South India, Pub. By International books and Periodicals supply service, New Delhi .
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32. Samwavs; M.J. (1981) Biological control of, pest and weeds Ecward Arnold. (Publishers) limited, 41 Before Bedford Squar, London.
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45 Street, H.E.(1977) Plant tissue and cell culture: B'ackwell London.
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SERICULTURE
SEMESTER-IV

Course No. USEPC402 **Credit: 02**
Course Title: Practical
Duration: 2½ **Hours** **Maximum Marks: 50**
External: 25
Internal: 25

1. Cytological techniques. Preparation of pre-treatment solutions-fixatives and Staining procedure.
2. Somatic chromosomes mitosis and root/shoot meristem.
3. Stomata and stomatal chloroplast: number and frequency.
4. Morphological studies of
   a. Egg characters, shape, shell colour.
   b. Larval characters; colour of newly hatched larva.
   c. Cocoon colour, cocoon shape
   d. Pupal characters.
5. Anatomy of stem and leaf.
6. Observations of different characteristics in various silkworm breeds
7. Selection of cocoon for breeding based on various characters.
8. Study of Mutant silkworm larvae

Distribution of 25 marks of Internal Assessment Practicals under CBCS

1. Daily evaluation of Practical records and Internal Practical Test: **15 Marks**

   Marks obtained on the basis of day to day performance
   in the lab/field =**08 marks**
   Further distribution of marks on the basis of grades:
   α = 9/10
   β = 7/10
   γ = 5/10
   To be converted out of 08 marks.
   Internal Practical Test= **07 Marks**

2. Marks of Attendance : **05 Marks**
   Distribution:
   <75% = 0 marks
   75%-80% = 6 marks
   81- 90% = 8 marks
   91%-100% = 10 marks
3. Viva-voce : **05 Marks**

Total=25 marks

SERICULTURE

SEMESTER- IV
EXAMINATION TO BE HELD IN THE YEARS MAY 2018, 2019 2020
UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETS403 Credit: 04

Course Title: Silkworm Seed Technology

Duration: 2½ Hours Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There will be one written theory paper of 100 marks. University Semester End Examination will be set for 80 marks (80%) of three hours duration and 20% of marks shall be reserved for internal assessment. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

Unit- I

1.1 Silkworm Seed; importance, Types, status of silkworm seed production in India and demand trends.

1.2 Silkworm seed organization; significance, multiplication centres-P4, P3, P2 and P1.

1.3 Seed areas- identification, concept of selected seed rearers / villages- Seed Legislation Act- maintenance of seed crops.

1.4 Seed cocoon markets- pupal examination, certification of seed cocoon lots- price fixation for seed cocoons.

1.5 Monitoring of seed crop-screening of egg shells, larvae, faecal matter for disease.

Unit-II

2.1 Disinfection and hygiene in seed production units.

2.2 Seed production centers (grainages)- types of grainages- organization and functions of grainages.

2.3 Plan for model grainage- grainage equipments and their use - Seed production plan.

2.4 Procurement and transportation of seed cocoons; Sorting of defective cocoons.

Unit-III

3.1 Preservation of seed cocoons- Environmental conditions required for seed cocoon preservation.

3.2 Moth emergence and synchronization; sex separation in moth; effect of improper synchronization on egg hatching and quality-safe duration.

3.3 Coupling and decoupling; oviposition-Rejection of weak and deformed moths; Duration and isolation of pairing; Potency and reuse of male moths.

3.4 Method of egg production; Loose egg and sheet egg Preparation, Advantages and disadvantages.

Unit-IV

4.1 Mother moth examinations- individual and mass methods- dry moth examination; environmental conditions for grainage activity.

4.2 Handling of multivoltine eggs- preservation of eggs to postpone hatching- ideal embryonic stages for cold storage- maximum duration of cold storage.

4.3 Handling of bivoltine eggs for early hatching- physical and chemical methods- hot and cold acid treatment.

4.4 Postponement of hatching; hibernation schedule for 3, 4, 6 and 10 months duration.

Unit-V

5.1 Staff and labour requirement during seed production.

5.2 Planning of seed production-programme of brushing, synchronized brushing of races.

5.3 Economics of seed production; Calculation of unit cost of silkworm seed considering capital expenditure, recurring and non recurring expenditure, working capital, cost of seed cocoons, cost of chemicals, equipments and other miscellaneous contingent expenditure.

5.4 Maintenance of seed production records and protective measures in seed production.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

The internal assessment under Choice Based Credit System shall be of 1 hour duration and shall comprise of two parts.

Part A: Total weightage of Part A will be 10 marks and shall comprise of 8 short questions selecting atleast from 2 to 3 units (50% of syllabus covered).A candidate will have to attend any 5 questions each carrying 2 marks.

Part-B: Total weightage of Part-B will be 10 marks and shall comprise of 2 long answer questions from first 2 to 3 units. A Candidate will have to attempt only 1 question of 10 marks.

Note 2: For paper setters :External End Semester University Examination

The External examinations in theory shall consist of the 3 sections.

Section A: Section-A shall be of 15 marks and will comprise of 5 short answer type questions, one from each of the units and carrying 3 marks each. Answers should be precise having 70 to 80 words only and without any detailed explanation (**All Compulsory**).

Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

Section C: Total weightage of Section-C shall be 30 marks and will comprise of 5 long answer type questions, one from each of the units. A candidate will have to attempt only 2 questions from all the questions and will carry 15 marks each. Answers should be of 500 to 600 words with detailed analysis/explanation/critical evaluation to the question.

BOOKS RECOMMENDED

1. Ayuzaw, Co., Sckido, I., Yamakawa, R.Rokural, U. Ruraia, Vaginuma, Y and Tokoro, Y (1972): Handbook of Silkworm rearing, Fuji Publishing Co. Ltd. Tokyo.
2. Biram Saheb and puttaswamy Gowda (1987): Appropriate sericulture techniques Chapterll(Edjfed by Jolly ICTRETS, CS and TI, Mysore.
3. Hurradli, H.K. and A. Manjula (1991): Artificial-hatching of bivoltine silkworm eggs, *Bombyx mori.* at different hours of oviposition for tropical conditions. Sericolopic 31 (2).345-347. I
4, Jully I M.S. (1903): Organisation of Industrial 81voltine Grainage for Tropics, Sericulture Project No.3, CSR &'TI Mysore.
5. Krishnaswamy, S (1971): Manual on sericulture Vol. II Publ. FAO, Rome
6. Narasimhanna, M.N. (1988): Manual on Silkworm egg production published by Central Silk Board.. Bangalore
7. Manjula A., and H.R.Harardi 1993. Cold acid treatment for Bivoltine Silkworm eggs for Tropical countries. Indian Journal of Sericulture 26:25-29.
8. Manjula, A., Acid treatment for hybrid silkworm:- eggs for tropical countries.Indian J. of Sericulture 29; 138-141.
9. Manjula, A,(1991) A Scientific method of incubating the silkworm eggs. lndian Silk 30(8):7.-14.
10. Tanaka, Y. (1964), Sericology; published by in English by Central Silk Board Bombay. ,
11. Tazima, Y. (1962): Silkworm Egg published by Central Silk Board Bombay.
12. Tazima, Y. (1978): the, Silkworm an important Laboratory tool, Kodansha Ltd.Tokyo.
13. Takami, T. (1964) Guide to Silkworm egg protection and handling.
14. Ullal, S.R. and H.W., Narsimbanna (1978): Handbook of Practical Sericulture, Published by Central Silk Board, Bangalore.
15. Tokoyama I., (1962), Synthesised Science of Sericulture, Published *,in* English by Central Silk Board, Bombay.
16. Silkworm Rearing Techniques in Tropics (1980) Published by JICA. Tokyo, Japan.
17. Text Book of Tropical Sericulture (1980):Published by JICA, Tokyo, Japan.
18. FAO Manual of Sericulture VoL. III.

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SERICULTURE

SEMESTER- V

EXAMINATION TO BE HELD IN THE YEARS DEC 2018, 2019 2020

UNDER CHOICE BASED CREDIT SYSTEM

Course No. **USETE501** Credit: 04

Course Title: Silkworm Seed and Silk Technology

Duration: 2½ Hours Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There shall be a Semester End Examination for theory of 100 marks and practical paper of 50 marks. Theory and practical papers shall be of three hours duration each.20% of marks shall be reserved for internal assessment in theory paper and 50% in practical paper. Semester End Examination for Theory paper will be set for 80 marks and final practical paper for 25 marks. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

UNIT-I

1.1 A general account of silkworm seed, grainages production and demand trends

1.2 Seed organization:

- 1.2.1 Significance of seed organization, maintenance of parental stock and its multiplication. :
- 1.2.2 Identification of areas of seed rearers, seed legislation act- rules and regulations.
- 1.2.3. Monitoring of seed crops:
  - 1.2.3.1 Screening of egg shells, larvae and faecal matter for diseases.
  - 1.2.3.2 Maintenance of hygienic conditions during rearing.

1.3 Disinfection in the seed production units.

1.4. Role of temperature, humidity, Light and air in Cocoon preservation and oviposition.

1.5 Brief account of seed production centres (SPC):

- 1.5.1 Organization and function of seed production centers.
- 1.5.2 Plan of Model Grainage inclusive of cold storage facilities.
- 1.5.3 Infrastructure for SPC requirement of each room, equipments and their utilization.

1.6 Procurement, transportation, processing and preservation of seed cocoon.

- 1.6.1 Sex separation in seed production.
- 1.6.2 Importance of synchronization emergence.

1.7 Pairing of moth:

- 1.7.1 Rejection of weak and deformed moths.
- 1.7.2 Duration and isolation of pairing and effect of delayed pairing.
- 1.7.3 Potency and reuse of male moths.

UNIT-II

2.1 Mother moth examination:
- 2.1.1. Individual, sampling and mass methods of examination.
- 2.1.2 Green and dry moth examination.
- 2.1.3 Advantages and disadvantages of various methods.

2.2. General account of handling and preservation of multivoltine eggs.

2.3 Handling of bivoltine eggs for early hatching:
- 2.3.1 Physical and chemical methods.
- 2.3.2 Hot and cold acid treatments-advantages and disadvantages.
- 2.3.3 Relationship between temperature and specific gravity of acid.
- 2.3.4 Ideal age of eggs for acid treatment and precautions.
- 2.3.5 Postponement of Acid treatment and cold storage of acid treated eggs.
- 2.3.6 Short term chilling and ordinary chilling methods.
- 2.3.7 Long term preservation.

2.4. Grainage Management:
- 2.4.1 Staff and labour requirement, grainage equipment and their maintenance.
- 2.4.2 Monitoring and supervision-rapport with seed cocoon growers, arrangement for seed, cocoon procurement and its maintenance.
- 2.4.3 Planning for seed cocoon production-programme of brushing, synchronized brushing of races in villages.

2.5. Economics of seed production:
- 2.5.1 Cost of seed cocoon, cold storing of eggs, depreciation cost on the equipment, interest on capital for purchase of seed cocoon, cost of chemicals, equipments, egg, sheets, stationery furniture and miscellaneous contingent expenditure.
- 2.5.2 Maintenance of records and protective measure of seed production.

UNIT-III

3.1 Introduction to textile fibers

3.2 Physical and chemical properties of silk and uses of silk.

3.3 Raw materials for silk reeling
- 3.3.1 Factors affecting the production of silk yarn.
- 3.3.2 Selection of cocoon for reeling. .
- 3.3.3 Assessment of renditta.

3.4 Processing of cocoons:

3.4.1. Stifling-conventional and modern -techniques, steam stifling, hot air dryer, batch types and conveyor types-their advantages and disadvantages.

3.4.2 Sorting of defective cocoons, methods of storing and preservation of stifled cocoons.

3.4.3 Various methods of cocoon boiling- open-pan, three pan and pressurized cocoon boiling methods.

3.4.3 Cocoon brushing-hand brushing and mechanica1 brushing.

UNIT -IV

4.1 Reeling
- 4.1.1. Objectives study of yarn passages, raw silk yarn, size (denier) and its importance.
- 4.1.2 Cocoon feeding, reeling speed, production and calculation.
- 4.1.3. Objectives and importance of re-reeling.
- 4.1.4 Skein formation and finishing, factors influencing the quality of fibers.

4.2 Brief description of each machine from technological view:

4.2.1 Stifling-steam stifling, hot air dryer- batch type and conveyer type.
4.2.2 Boiling-open pan, three pan and pressurized cocoon boiling.
4.2.3 Reeling-conventional charaka, improved charaka, automatic or semi. Automatic silk reeling machines.

4.3 Quality of water required for reeling:
4.3.1. Effects of water quality in silk reeling.
4.3.2 Man power and skill reeling and its necessity.

4.4. Cocoon and raw silk testing and grading:
4.4.1 Cocoon testing Methods.
4.4.2 Different tests for raw silk quality measurement, methods of testing.
4.4.3 Internationa1 and ISA standard of grading for raw silk.

UNIT V

5.1 Silk throwing and weaving:
5.1.1. Introduction and objectives of silk throwing, preparation for twisting, soaking, dressing, drying, winding and doubling.
5.1.2 Preparation for silk weaving: Warping, beaming, drawing and denting.
5.1.3 Study of power loom and handloom weaving.

5.2 Different types of fibers arid their uses:
5.2.1 Fabric defects and grading of silk fibers and uses.
5.2.2 Introduction and objectives of degumming, bleaching, dyeing and printing of silk yarns and fabrics.
5.2.3 Introduction to different class of dyes and chemicals used for silk dyeing.
5.2.4 Uses of reeling wastes in spun silk industry.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

The internal assessment under Choice Based Credit System shall be of 1 hour duration and shall comprise of two parts.

Part A: Total weightage of Part A will be 10 marks and shall comprise of 8 short questions selecting atleast from 2 to 3 units (50% of syllabus covered).A candidate will have to attend any 5 questions each carrying 2 marks.

Part-B: Total weightage of Part-B will be 10 marks and shall comprise of 2 long answer questions from first 2 to 3 units. A Candidate will have to attempt only 1 question of 10 marks.

Note 2: For paper setters :External End Semester University Examination

The External examinations in theory shall consist of the 3 sections.

Section A: Section-A shall be of 15 marks and will comprise of 5 short answer type questions, one from each of the units and carrying 3 marks each. Answers should be precise having 70 to 80 words only and without any detailed explanation (**All Compulsory**).

Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

Section C: Total weightage of Section-C shall be 30 marks and will comprise of 5 long answer type questions, one from each of the units. A candidate will have to attempt only 2 questions from all the questions and will carry 15 marks each. Answers should be of 500 to 600 words with detailed analysis/explanation/critical evaluation to the question.

BOOKS RECOMMENDED

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2. Biram Saheb and puttaswamy Gowda (1987): Appropriate sericulture techniques Chapterll(Edjfed by Jolly ICTRETS, CS and TI, Mysore.
3. Hurradli, H.K. and A. Manjula (1991): Artificial-hatching of bivoltine silkworm eggs, *Bombyx mori.* at different hours of oviposition for tropical conditions. Sericolopic 31 (2).345-347. I
4, Jully I M.S. (1903): Organisation of Industrial 81voltine Grainage for Tropics, Sericulture Project No.3, CSR &'TI Mysore.
5. Krishnaswamy, S (1971): Manual on sericulture Vol. II Publ. FAO, Rome
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8. Manjula, A., Acid treatment for hybrid silkworm:- eggs for tropical countries.Indian J. of Sericulture 29; 138-141.
9. Manjula, A,(1991) A Scientific method of incubating the silkworm eggs. lndian Silk 30(8):7.-14.
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11. Tazima, Y. (1962): Silkworm Egg published by Central Silk Board Bombay.
12. Tazima, Y. (1978): the, Silkworm an important Laboratory tool, Kodansha Ltd.Tokyo.
13. Takami, T. (1964) Guide to Silkworm egg protection and handling.
14. Ullal, S.R. and H.W., Narsimbanna (1978): Handbook of Practical Sericulture, Published by Central Silk Board, Bangalore.
15. Tokoyama I., (1962), Synthesised Science of Sericulture, Published *,in* English by Central Silk Board, Bombay.
16. Silkworm Rearing Techniques in Tropics (1980) Published by JICA. Tokyo, Japan.
17. Text Book of Tropical Sericulture (1980):Published by JICA, Tokyo, Japan.
18. FAO Manual of Sericulture VoL. III.
19. Raw Silk reeling-B.H. Rim.
20. Silk Textile Engineering -B.H.Rim. Paoto'
21. Filature water engineering-B.H.Rim.
22. Silk Biology, Chemistry technology- Paoto Carponic.
23. Silk reeling techniques tropics, Omom.
24. Silk dyeing, printing and finishing Gulrajani.
25. Silk production, processing and marketing-Mahesh N. Nanavaty.
26. Hand book of Textiles Testing ISI (BIS) bureau of Indian std. !
27. Principle of Textile Testing-J.E. Boothe.
28. Silk production arid weaving in India, C.C.Ghosh.
29. Appropriate sericulture Technique, .M-B .Jolly. .
30. Dyeing of wool and manufacture, R.S.Prayag.
31. Development of Indian Silk, Sanjay Sinha.

32. Sericulture and Silk Industry, Tripurari Sharma.
33. Introducing Textile Scion. M.L. Rah.
34. Silk Industry Problem and prospects. A.Ajaz H.Lawpper.
35. Textile fiber/polymer by Mathew. .
36. Weaving Calculation-Surpaum
37. Advance Textile design and colour Watson.
38. Encyclopedia of Textile.
39. Textile Fibers-Hess.
40. Sericultural Technology, Choe- Byong Head Hee.
41. Silk processing-Rim
42. Dyeing of Textile Fibers, Shanoy.

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SERICULTURE

SEMESTER-V

Course No. USEPC 502 **Credit: 02**

Course Title: Practical

Duration: 2½ **Hours** **Maximum Marks: 50**

External: 25

Internal: 25

1. Mother moth examination-individual and mass, whole and sampling methods, surface sterilization of silkworm eggs.
2. Identification of textile fibers by physical and chemical test, microscopic examinations, flame tests and solubility test for polyester, cotton and silk:
3. Identification of defective cocoon and their percentage in a lot of cocoon, determination of shell ratio of good cocoons.
4. Water analysis- pH, total hardness, total alkalinity, electro conductivity and chlorides.
5. Processing of seed cocoons, deflossing, sorting, selection of good cocoons, assessment of good cocoon, pupal examination.
6. Cutting of seed cocoon, seed separation by pupal method-preservation of cocoon/pupa, maintenance of temperature, humidity and light factors.
7. Plan of model grainage building and grainage equipments-visits to the commercial grainage and maintenance of record in the grainage.
8. Visit to multivoltine and bivoltine seed (seed rearers) seed farms and cocoon markets.
9. Study of multiend silk reeling machines-Automatic and semi-automatic reeling machines, practical demonstration, visit to filature.
10. Charka reeling -economic model of silk reeling unit (Demonstrative)

Distribution of 25 marks of Internal Assessment Practicals under CBCS

1. Daily evaluation of Practical records and Internal Practical Test: **15 Marks**
   Marks obtained on the basis of day to day performance
   in the lab/field =**08 marks**
   Further distribution of marks on the basis of grades:
   α = 9/10
   β = 7/10
   γ = 5/10
   To be converted out of 08 marks.
   Internal Practical Test= **07 Marks**
2. Marks of Attendance : **05 Marks**
   Distribution:
   <75% = 0 marks
   75%-80% = 6 marks
   81- 90% = 8 marks
   91%-100% = 10 marks
3. Viva-voce : **05 Marks**

Total=25 marks

SERICULTURE
SEMESTER- V
EXAMINATION TO BE HELD IN THE YEARS 2018, 2019 2020
UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETS 503 Credit: 04
Course Title: Silkworm Rearing Technology

Duration: 2½ Hours Maximum Marks: 100
Theory Examination: 80
Internal Assessment: 20

There will be one written theory paper of 100 marks. University Semester End Examination will be set for 80 marks (80%) of three hours duration and 20% of marks shall be reserved for internal assessment. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

Unit-I

1.1 Taxonomy of silkworm, different breeds/hybrids of silkworm with special reference to J & K- their economic traits.
1.2 Classification of silkworms based on moultinism, voltinism and geographical distribution.
1.3 Morphology of egg, larvae, pupa and adult.
1.4 Life cycle of silkworm *Bombyx mori* L.

Unit-II

2.1 Rearing house: Construction of ideal rearing house at suitable site and of suitable size, representing CSB model.
2.2 Rearing appliances: Early and Late age (leaf chambers, chopping knife and chopping board, rearing trays, rearing stands and racks, feathers, chopsticks, net, paraffin papers, rubber foam pads, ant-wells, mountages etc.).
2.3 Methods and frequency of feeding, Methods and schedule of bed cleaning and spacing. Moulting; care during moulting.
2.4 Incubation- definition, requirement of environmental conditions, incubation devices; identification of stages of development; black boxing and its importance.

Unit-III

3.1 Preparation of Chawki rearing; brushing and brushing methods; hatching and brushing percentage.
3.2 Types of chawki rearing (traditional method, paraffin paper with foam rubber and wrap-up method)
3.3 Late age silkworm rearing (shelf, floor and shoot method).

3.4 Mounting and cocoon production: types of mountages, transfer of matured silkworms, care during mounting and features of ripe worms and spinning of cocoons.

Unit- IV

4.1 Harvesting of leaf methods; Advantages and disadvantages.
4.2 Time of harvesting and care during transportation of mulberry leaves.
4.3 Storage of mulberry leaves for chawki and late age silkworms.
4.4 Selection of mulberry leaves for different instars.

Unit-V

5.1 Harvesting and storage of cocoons: Harvesting, preservation, assessment, storage.
5.2 Physical characters of cocoons, defective cocoons, record maintenance, cost of cocoon production, leaf-cocoon ratio.

5.3 Diseases of *Bombyx mori* L. (protozoan, bacterial, viral and fungal) and Pests of*Bombyx mori* L. (Techinid (Uzi) fly, Dermestid beetels, ants, rodents and lizards).
5.4 Disinfection and the preparation of different disinfectants for rearing house.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

The internal assessment under Choice Based Credit System shall be of 1 hour duration and shall comprise of two parts.

Part A: Total weightage of Part A will be 10 marks and shall comprise of 8 short questions selecting atleast from 2 to 3 units (50% of syllabus covered).A candidate will have to attend any 5 questions each carrying 2 marks.

Part-B: Total weightage of Part-B will be 10 marks and shall comprise of 2 long answer questions from first 2 to 3 units. A Candidate will have to attempt only 1 question of 10 marks.

Note 2: For paper setters :External End Semester University Examination

The External examinations in theory shall consist of the 3 sections.

Section A: Section-A shall be of 15 marks and will comprise of 5 short answer type questions, one from each of the units and carrying 3 marks each. Answers should be precise having 70 to 80 words only and without any detailed explanation (**All Compulsory**).

Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

Section C: Total weightage of Section-C shall be 30 marks and will comprise of 5 long answer type questions, one from each of the units. A candidate will have to attempt only 2 questions from

all the questions and will carry 15 marks each. Answers should be of 500 to 600 words with detailed analysis/explanation/critical evaluation to the question.

BOOKS RECOMMENDED

1. Manual on Silkworm egg production: M.N Narasimhanna, Pub. By CSB, Banglore, 1988.
2. Silkworm rearing: Vuoang-Chun and Chen Da-Chung; Pub. By FAO, Rome, 1988
3. A guide for bivoltine Sericulture; K.Sengupta, Director, CSR & IT, Mysore, 1989.
4. New technology of Silkworm Rearing: S.Krishnaswamy, Reprinted by CSB, Banglore 1989. ,
5. Improved method of rearing young age silkworms: S. Kirshnaswamy, Reprinted by CSB Banglore,
6. The Principles of Insect physiology: V.B. Wigglesworth: Pub. By English Language book Soc.., Chapman & Hal, 1972.
7. Economics of sericulture under irrigation conditions: M.S. Jolly, CSR & TI, Mysore- 8,1982.
8. Economics of Sericulture under Rain fed conditions, M.S.Jolly, CSR & TI. Mysore, 1982.
9 The Silkworm-an important laboratory tool, ed. By Y.Tazima, Kodansna, Japan.
10. Silk from grub to glamour: Mahesh M.Nanavathy, Pub. In Indian Paramount House, Bombay, 1965
11. Principles of Insect Morphology: R.E.Snodgrass, Tata McGraw Hill Pub. Co. Ltd. : Bombay, 1935.
12. Insect Biology in the future, VBW BO, Ed by Michael Locke, David S. Smith, Academic Press, 1980.
13. Silkworm Biology and Rearing, A.K.Dhole, Project Coordinator, NCERT, New Delhi, 1990.
14. An Introduction to sericulture, Ganga G. and J. Sulochana Shetty-Oxford and IBH .Pub. 1991.
15. China Sericulture, 1972, FAO, Rome.
16. Silkworm Rearing and Diseases of Silkworm, 1956, Ptd. By Director of Ptg. Stn, & Pub. Govt. Press, Bangalore.
17. Choebyong Hone 1972; Sericultural. Technology, Pvt. By Seoul National University Press, Korea.
18. Silkworm Rearing Techniques in Tropics; Seinosuka Omura, 1973, OTCA, Tokyo, .Japan.
19. Sericology, Tanaka, Y. 1964, CSS Pub, Bangalore.
20. Synthesised Science of Sericulture, Yokoyama, 19.54, Pub. With permission of Sugimani -KO, Tokyo.
21. Handbook of Sericulture-I; Yonemua, M and Rama Rao, N.1925. Mysore govt. Ptg. Press.
22. Cytoplasmic polyhedrosis Virus of the Silkworm, Hissa Aruga and Tanada, Y, 1971, Univ. of Tokyo Press, Japan.

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SERICULTURE

SEMESTER- VI

EXAMINATION TO BE HELD IN THE YEARS 2019, 2020 2021

UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETE601 Credit: 04

Course Title: Sericulture Extension Organisation Management and Non-Mulberry Sericulture

Duration: 2½ Hours Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There shall be a Semester End Examination for theory of 100 marks and practical paper of 50 marks. Theory and practical papers shall be of three hours duration each.20% of marks shall be reserved for internal assessment in theory paper and 50% in practical paper. Semester End Examination for Theory paper will be set for 80 marks and final practical paper for 25 marks. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

UNIT-I

1.1. Extension:

1.1.1. Definition, meaning, origin and growth of extension work education.

1.1.2. Attributes and training of extension work.

1.1.3. Community development programmes -Role of extension in rural development. Sericulture as tool for rural development

1.2. Extension education methods and communication:

1.2.1. Learning and teaching extension-formal and informal education.

1.2. 2 Agricultural, Sericultural extension system in India (merits and limitations):

1.2.2.1 Training and visits system,

1.2.2.2. Extension teaching methods -Farm and Home visits.

1.2.2.3. Farmer's training programme-Lectures, symposium, panel and forum as extension methods.

1.2.2.4. Field day and field trips.

1.2.2.5. Map contact methods. -Radio, T. V., Farm publication, Film shows.

1.3. Sericulture extension organization:

1.3.1. Organization at various levels, especially C.S.B. Policy for development, research and training in state and at National level.

1.3.2. Sericulture service net work –B.S.F., seed area, grainages, nurseries, CRC, TSC's, Cocoon market, filature, silk exchanges and cocoon certification centres.,

UNIT-II

2.1 Marketing Management:

2.1.1. Sericultural marketing organization, their merits and limitation.

2.1.2. Traditional and regulated markets of seed, cocoon, raw silk and silk fabric. 2.1.3. Government intervention legislation, implications.

2.1.4. Marketing institutions - marketing boards -cooperative with special reference to J& K State.

2.2 Cooperative and credit agencies:
- 2.2.1. Definition, types, Sericultural cum farmer's cooperative societies (Cooperative C.R.C., Cooperative farming society, cooperative yarn produces society, silk marketing society credit cooperatives).
- 2.2.2. Financing agencies in Sericulture
  - 2.2.2.1. Short term, mid term and long term financing, NABARD. SlDBl, IDBI and Bank
- 2.2.3 Unit cost, importance of credit in sericulture.
- 2.2.4. Assistance for sericulture: IRDP, ITDP. TADA, Special component schemes

2.3 Feed back system:
- 2.3.1. Survey types, merits and limitations.
- 2.3.2 Collection of data and its evaluation

UNIT-III

3.1. History of non-mulberry sericulture: Types of non-mulberry silkworms and their distribution in India and other countries.

3.2. Production of mulberry and non-mulberry silk in India and other countries:
- 3.2.1. Comparative production efficiencies, prospectus and problems in developing countries.
- 3.2.2. Non mulberry sericulture organizational set up, administrative, research and training.
- 3.2.3. Cocoon production and marketing (reeling and weaving sectors).
- 3.2.4. Employment potential and comparison to other cottage industries.

3.3. Non mulberry sericulture and its relevant to social forestry schemes.

3.4. Tassar Culture:
- 3.4.1. Tassar culture and its association with forest tribes.
- 3.4.2. Distribution of tropical tassar flora -primary and secondary food plants in different states.
- 3.4.3. Distribution of temperate farmer flora -primary and: secondary food plants.

3.5. Muga Culture and its endemic nature to Assam:
- 3.5.1. Primary and secondary food plants distribution

3.6 Eri-Culture- primary and secondary food plants

UNIT -IV

4.1 Morphology and rearing of non mulberry silkworms
- 4.1.1. Morphology of egg, larva, pupa and moth.
- 4.1.2. Digestive system of Larva.
- 4.1.3. Ecological conditions and improved rearing methods-for young & late-age silkworms.
- 4.1.4. Mounting methods; different types of mountages used.
- 4.1.5. Disinfection; different types of disinfectants.

4.2 Seed Cocoon:
- 4.2.1 Procurement, preservation.
- 4.2.2. Synchronization of moth emergence.
- 4.2.3. Problems in seed supply

4.3 Reeling of Tassar, muga & Eri Cocoons.
- 4.3.1. Basic differences between mulberry and non-mulberry silk reeling.

4.3.2. Different reeling machines. Traditional and modern methods of reeling.

4.4 Spinning: principles of spinning, different spinning methods & types of spun silk.

UNIT V

5.1 Diseases of non-mulberry silkworms

5.1.1. Symptoms, causative agent, preventive and control measures of protozoan disease.

5.1.2. Symptoms, causative agents, preventive and control measures of bacterial disease.

5.1.3 Symptoms, causative agents, preventive and control measures of viral and fungal diseases.

5.2 Pests and predators of non-mulberry silkworms, seasonal abundance, nature and extent of damages of various pests and their control.

5.3 Management of extension organizations in non-mulberry sericulture

5.3.1. Management for effective participation of farmers.

5.3.2. Functions of Management in non-mulberry sericulture.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

Internal Assessment Test (20 marks)

The internal assessment under Choice Based Credit System shall be of 1 hour duration and shall comprise of two parts.

Part A: Total weightage of Part A will be 10 marks and shall comprise of 8 short questions selecting atleast from 2 to 3 units (50% of syllabus covered).A candidate will have to attend any 5 questions each carrying 2 marks.

Part-B: Total weightage of Part-B will be 10 marks and shall comprise of 2 long answer questions from first 2 to 3 units. A Candidate will have to attempt only 1 question of 10 marks.

Note 2: For paper setters :External End Semester University Examination

The External examinations in theory shall consist of the 3 sections.

Section A: Section-A shall be of 15 marks and will comprise of 5 short answer type questions, one from each of the units and carrying 3 marks each. Answers should be precise having 70 to 80 words only and without any detailed explanation (**All Compulsory**).

Section B: Section-B shall be of 35 marks and will comprise of 5 medium answer type questions, one from each of the units and carrying 7 marks each. Answers should be comprehensive having 250 to 300 words only and with detailed explanation (**All Compulsory**).

Section C: Total weightage of Section-C shall be 30 marks and will comprise of 5 long answer type questions, one from each of the units. A candidate will have to attempt only 2 questions from all the questions and will carry 15 marks each. Answers should be of 500 to 600 words with detailed analysis/explanation/critical evaluation to the question.

BOOKS RECOMMENDED

1. Anonymous, 1952, manual and Department of Sericulture, Mysore.

2. Anonymous, 1973, proceeding of XII International Sericulture Congress Barcelona. .
3. Anonymous, 1989, Sericulture Development in Asia: Asia Publication (1989) Bangkok, Thailand.
4. Anonymous, 1992, Bill Silkman's Companion, CSO Publication, Bangalore
5. Jully, M.S.. 1981', a technical report on sericulture in Japan.
6. Joshi, P. C. 1987, Institutional aspects of Agricultural Development; India from Asian Perspective, Allied Publishers Pvt. Ltd.'
7. Nanavathy, M. 1965, Silk from grub to glamour.. .
8. Ramana, D.V. 1987, Economics of, Sericulture and Silk Industry in India. Deep and Deep publishers, New Delhi.
9. Sinha, S. 1960, the development of Indian Silk -A wealth of opportunities.
10. Supa, S.V. An introduction to extension education.
11. Advi Reddy-Extension Education.
12. Dhamo, O.P. and I3liatnagar, a.p.. Location and communication for development. ,
13. Regers, C.M. and Sheevalkar, 1962, dillusion of innovation.
14. Spincer, E.H. Human problems in technological changes. /
15. Kalse, C.D. and Hirne, 1967 Cooperative extension work, Comstock Association, New York.
16. Monanty, B.B. 1962, I Hand, Book of audiovisual aids.
17. Manual of Sericulture, FAO Volume A.
18. Huge Culture, S:N. Choudhary.
19. Sericulture; S.N. Choudhary. .
20. Tassar 4 Culture, M.S.Jolly and others, Ampika Pub. Bombay. ...
21. Silk work and its culture, S'.N. Choudhary.
22. Sericulture and silk industry. Tripurari Sharan.
23. Handbook of Muga culture, K. Thangavalu and Md. Isa.
24. A silkworm rearers handbook -W,S.B. Crotch.
25. Destructive and useful insects 'Metcalf and Flint,
26. Raw silk reeling BH.Kim
27. Fjlature water Engineering B.H. Kim
28. Textile Fiber and their use, Mess.

University of Jammu, Jammu 180 006

SERICULTURE

SEMESTER-VI

Course No. USEPE602 **Credit: 02**

Course Title: Practical

Duration: 2½ **Hours** **Maximum Marks: 50**

External: 25

Internal: 25

1. Morphology of egg, larva, pupa; Cocoon and moths of different non mulberry silkworms, different eco types of non mulberry silkworms.
2. Study of silk fabric manufacturing unit, powerloom and handloom (visit to spun silk mill), study of silk dyeing and printing unit -visit to practical centres.
3. Visit and report preparation of technical service centre (sericulture) and C.R.C's
4. Visit to sericulture research institution and preparing a bulletin on technologies developed.
5. Visit to cocoon market and anyone regulated agricultural market.
6. Discussion with NABARD, IDBI and a lead bank officer regarding sericulture credit facilities and procedures.
7. Preparation of a project detailing cost and economic in sericulture.
8. Visit to Research and Development Institute or Southern States of India (Educational Tour).
9. Visit to temperate and tropical sericulture states of India (Educational tour).

Distribution of 25 marks of Internal Assessment Practicals under CBCS

1. Daily evaluation of Practical records and Internal Practical Test: **15 Marks**

   Marks obtained on the basis of day to day performance
   in the lab/field =**08 marks**
   Further distribution of marks on the basis of grades:
   α = 9/10
   β = 7/10
   γ = 5/10
   To be converted out of 08 marks.
   Internal Practical Test= **07 Marks**

2. Marks of Attendance : **05 Marks**
   Distribution:
   <75% = 0 marks
   75%-80% = 6 marks
   81- 90% = 8 marks
   91%-100% = 10 marks
3. Viva-voce : **05 Marks**

Total=25 marks

SERICULTURE
SEMESTER- VI
EXAMINATION TO BE HELD IN THE YEARS 2019, 2020 2021
UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETS603
Credit: 04
Course Title: Silk Reeling Technology
Duration: 2½ Hours
Maximum Marks: 100
Theory Examination: 80
Internal Assessment: 20

There will be one written theory paper of 100 marks. University Semester End Examination will be set for 80 marks (80%) of three hours duration and 20% of marks shall be reserved for internal assessment. In case of regular students, internal assessment received from the colleges will be added to the marks obtained by them in the University Semester End examination and in case of private candidates, marks obtained by them in the university examination shall be increased proportionately in accordance with the Statutes / Regulation.

Unit- I

1.1 Physical and commercial characteristics of cocoons: cocoon colour, shape, size, hardness, grain/wrinkle, weight of cocoon, weight of cocoon shell, shell ratio.
1.2 Cocoon marketing- Procedure for procurement of raw material- purchase of cocoon in open auction; grading of cocoons- visual inspection and selection.
1.3 Cocoon sorting: Objectives and procedure; defective cocoons- double, flimsy, melted, urinated, stained, uzi-infested, moth emerged, deformed and flossy.
1.4 Cocoon stifling: Definition, objectives, different methods-conventional and modern techniques- steam stifling. Hot air drying- Batch type and conveyer type; advantages and disadvantages.

Unit-II

2.1 Conditioning and preservation-Methods of storing and preservation of stifled cocoons.

2.2 Cocoon cooking/boiling: Definition and objectives, different methods of cocoon boiling- Mono pan, three pan and pressurized cocoon boiling methods.

2.3 Cocoon brushing: Definition and objectives; methods- stick, hand and mechanical brushing.

2.4 Reeling water; quality required for silk reeling, total and permanent hardness, optimal pH; corrective measures.

Unit-III

3.1 Reeling: Objective and cocoon reeling from various devices-country charka, cottage basin, multi end reeling machine, auto and semi-automatic, improved reeling devices; advantages and disadvantages.

3.2 Re-reeling and packing: Objectives, process; lacing, skeining, booking and baling.

3.3 Raw silk properties- physical, chemical and biological. Uses of raw silk- Textile and Other commercial uses.

3.4 Raw silk testing and grading; Visual inspection. Mechanical tests- winding test, size deviation test, Seri plane test, serigraph test and cohesion test.

Unit-IV

4.1 Silk weaving: Warp preparation- warp, beaming, drawing and denting. Weft preparation- different pirn winding methods.

4.2 Power loom and handloom weaving. Flow chart of weaving; weaving defects.

4.3 Chemical processing of silk yarns and fabric:Introduction and objectives of degumming- Methods.

4.4 Silk bleaching- Importance and processing.

Unit-V

5.1 Silk dyeing-Acidic and basic dyeing processing. Introduction of different classes of dyes and chemicals used for silk dyeing.

5.2 Detailed study of spun silk industry- various steps involved, flow chart, spun silk yarn and noil yarn.

5.3 Introduction to bye-products of sericulture industry, their utilization types of silk waste.

5.4 Pupal waste-oil extraction and cake preparation.

Note: 1: There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment (20 marks). 80% of the marks (80 marks) shall be reserved for external examination to be conducted by the University/Colleges.Theory paper will be set for 80 marks.

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BOOKS RECOMMENDED

1. Raw Silk reeling-B.H. Rim.
2. Silk Textile Engineering -B.H.Rim. Paoto'
3. Filature water engineering-B.H.Rim.
4. Silk Biology, Chemistry technology- Paoto Carponic.
5. Silk reeling techniques tropics, Omom.
6. Silk dyeing, printing and finishing Gulrajani.
7. Silk production, processing and marketing-Mahesh N. Nanavaty.
8. Hand book of Textiles Testing ISI (BIS) bureau of Indian std.!
9. Principle of Textile Testing-J.E. Boothe.
10. Silk production arid weaving in India, C.C.Ghosh.
11. Appropriate sericulture Technique, .M-B .Jolly. .
12. Dyeing of wool and manufacture, R.S.Prayag.
13. Development of Indian Silk, Sanjay Sinha.
14. Sericulture and Silk Industry, Tripurari Sharma.
15. Introducing Textile Scion. M.L. Rah.
16. Silk Industry Problem and prospects. A.Ajaz H.Lawpper.
17. Textile fiber/polymer by Mathew. .
18. Weaving Calculation-Surpaum
19. Advance Textile design and colour Watson.
20. Encyclopedia of Textile.
21. Textile Fibers-Hess.
22. Sericultural Technology, Choe- Byong Head Hee.
23. Silk processing-Rim
24. Dyeing of Textile Fibers, Shanoy.