

# University of Jammu, Jammu 180 006

## SERICULTURE

### SEMESTER- I

#### EXAMINATION TO BE HELD IN THE YEARS DEC 2016, 2017 2018 UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETC101

Credit: 04

Course Title: Introduction to Sericulture & Soil  
Sciences.

Duration: 3 Hours

Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There shall be a Semester End Examination for theory and practical papers of 100 marks each. 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 50 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

**13 Hours**

- 1.1 Introduction to Sericulture, What is Sericulture-Scope of Sericulture, Origin and history of Sericulture Industry in India and other countries, Silk route.
- 1.2 World output of Silk, other natural fibres- Present status of silk production. Importance of natural fiber vis-a-vis manmade fibre, Role of silk fiber amongst natural fibres.
- 1.3 Silk Industry in World with special reference to China, Japan and India. Silk industry in silk producing states of India viz. Bengal, Karnataka, Tamil Nadu, Andhra Pradesh and Jammu and Kashmir; mulberry areas, sericulture villagers, no. of families, Cocoon and Silk production.
- 1.4 Characteristics of Sericulture Industry, International demand of Silk and constraints in Silk production like labour, land and environmental conditions.

#### UNIT II

**12 Hours**

- 2.1 Role of Central Silk Board in research and development of Sericulture in different states of India; Sericulture research and Development in Jammu And Kashmir State.
- 2.2 Introduction to mulberry silkworm and its food plants-what is mulberry sericulture
- 2.3 Characteristic features of different varieties of mulberry with special reference to J&K State. Different uses of mulberry

- 2.4 Introduction to non mulberry silkworm and brief account of their food plants. Different species of non-mulberry silkworm, their habit and habitat. . Types of Cocoon and silk produced by them.

**UNIT -III**

**13 Hours**

- 3.1 Grading of silk and brief account of Silk conditioning and Testing.
- 3.2 Employment potential of Sericulture industry in rural India, with special reference to J&K State.
- 3.3 Introduction to seed organization-What is seed organization. Need for seed organization.
- 3.4 Role of Women in Sericulture-Women participation in mulberry garden and rearing management-Silk reeling-Twisting, weaving and finishing.

**UNIT-IV**

**13 Hours**

- 4.1 Definition of soil, Introduction to soil forming factors;
- 4.2 Soil properties: Physical viz. Texture, structure, colour, permeability and air contents; soil water-Importance, moisture content.
- 4.3 Soil properties: Chemical viz. Ion exchange (anions and cations) and its significance, soil organic matter, Carbon-Nitrogen ratio and its significance.
- 4.4 Important soil types of India viz. alluvial, black, red, laterites and lateritic soils. Acidic and alkaline soils and their problems; reclamation.

**UNIT V**

**13 Hours**

- 5.1 Mulberry growth and nutrition; essential elements, their types; Integrated plant Nutrient management.
- 5.2 Source of nutrient elements in soil and their role in plant growth, including their deficiency and toxicity,
- 5.3 Soil and water conservation including types and causes of soil erosion.
- 5.4 Soil micro-organisms, their types and role in plant nutrition.
- 5.5 Soil pollution and Waste management

**NOTE FOR PAPER SETTING**

The question paper will have two sections. Section 'I' will be compulsory having ten questions of 2 marks each from whole of the syllabus. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

### **Distribution of 20 Marks of Internal Assessment under CBCS:**

Internal Assessment Test : 20 Marks ( Pattern: One long answer type question of 10 marks & Five short answer type questions of 2 marks each)

Syllabus to be covered in the examination: Upto 50%

Time allotted : 1 hour

### **BOOKS RECOMMENDED:**

1. Synthesized science of Sericulture by Yokoyama, Published by Central Silk Board-1954.
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. Publications
7. Mulberry Cultivation
8. Silkworm Rearing.
9. 3 Silkworm diseases
10. 4.Silkworm Egg. Production. .
11. 'Silk dyeing printing and finishing, Edited by M.L.Gulrajni, Department of textile Technology, Indian Institute of technology Hauz Khas, New Delhi-110d16
12. Raw Silk Reeling by KIM, Byung-HO.
13. Bibliography of the Technical Literature on silk by F.O.HOWITT.
14. Culture and sericulture by Prof. S.R.Charsnly.
15. Silk Production and Weaving in India by C.C.Bhosh, 1949 (Council of Scientific and Industrial Research)
16. Silkworm Genetics Illustrated by Tada Yokoyama.
17. Sericulture technical Book serial No. 18 Overseas technical Cooperation, March , 1971.
18. An analysis of Demand and Supply Prospects for Right Quality Raw Silk by, Gopal Naik and K.R. Babu, Centre for Management in Agriculture, Indian Institute of Management. Ahmedabad, 1991.
19. Sericulture for Rural Development Edited by M.B.Hanumappa.
20. Silkworm Rearing and Diseases of Silkworms by the Mysore Silk Association;'1956.

21. Eri Silk Industry, Directorate of Sericulture and Weaving, Government of Assam.
22. Tassar culture. Dr. M.S. Jolly *et.al*, CSB, 1974
23. Mysore State seminar on Silk Industry. Report, 1951
24. Hand Book of Silkworm Rearing, Fuzi Publications, 1972.
25. The Development of Indian Silk, Sanjay Sinha, 1990.
26. Sericulture by N.G. Mukerji, 1912.
27. Introduction to Silkworm Rearing, The Japan Silk Association, Inc. Tokyo, Japan.
28. .Silk by H.T. Gaddum and Company Ltd. Macchs Field, Chestrin.
29. The Genetics of the Silkworm by Yataro Tazima, 1964.
30. Silk Reeling Techniques in the Tropics by Japan International Cooperation Agency, Tokyo. Japan, 1981.
31. The Siikworm on Important Laboratory Tool. Edit, Y.Tazima, 1970.
32. Silkworm Breeding stock, Dr. P.A. Kovalov, CSB, 1970.
33. Silk Biology, Chemistry Technology by Dr. Paolo Carooni, 1952.
34. Sericulture Technology, By Choel Byong Hee, Seoul Natl. Uni. Press Korea, 1972.
35. Silkworm Rearing Techniques in the Tropics, Dr. S. Omura, Japan International cCorporation Agency, 1980
36. The Silk Book. The Silk and Rayon Users Association, London, 1951.
37. Muga Silk Industry by S.N Choudhary,. Directorate of Sericulture and Weaving, Government of Assam, 1982.
38. Sericulture Manual-I (Mulberry cultivation)1972.
39. Text book of Tropical Sericulture-1975, Pub. By Japan Overseas Corporation Volunteers, Sibuya-Ku, Tokyo, Japan. '
40. Jaisawal, P.L.1980, Hand Book of agriculture, India. Indian Council of Agriculture Research New Delhi.
41. Kvamer (Paul J.) 1969; Plant and Soil Water relationship: Modern Synthesis. York McGraw Hill.
42. Krishna Moorthy, H.N., 1975, Gibberellins and Plant Growth, Wiley Eastern, .Delhi.
43. The Nature and Properties of Soils (9t~ edition) N.C.Brady (MacMillion, Publications Co. Inc., New York).
44. Studies on Soils of India, S.V. Govinda Rajan and H.G.Gopala Rao (1970), Vikas Publ. House Pvt. Ltd. New Delhi/Bombay.
45. 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-I

**Course No. USEPC101**

**Duration: 3 Hours**

**Credit: 02**

**Course Title: Practical**  
**Maximum Marks: 100**  
**External: 50**  
**Internal: 50**

**64 Hours**

1. Sericulture maps.
  - a. World maps and silk route. .
  - b. India.
2. Organization set up in India General Information.
  - a. Govt. of India.
  - b. Five traditional States with special reference to J&K and Karnataka.
    - i. Karnataka
    - ii. Andhra Pradesh .
    - iii. Tamil Nadu
    - iv. West Bengal
    - v. Jammu and Kashmir.
3. Identification and study of sericulture products
  - a. Cocoon and silk yarn -different types.
  - b. Pupae
  - c. Silk waste
  - d. Spun Yarn
  - e. Noil Yarn.
  - f. Other by products.
4. Preparation of Histograms on world output
  - a. Of silk and'other textile fibers
  - b. Of silk fiber in different countries.

5. Study of soil profile
  - a. Study of different types of soil.
  - b. Soil sampling
  - c. Preparation of soil sample in the laboratory for analysis
  - d. Soil analysis for pH.
  - e. Determination of organic carbon
  - f. Determination of available nitrogen
  - g. Determination of available phosphorous and Potassium.
6. Visit to a soil testing laboratory,
7. Morphology for few important mulberry cultivators.
8. Propagation methods:
  - a. Preparation of nursery beds.
  - b. Collection of fruits and separation of viable seeds, seed sowing, seed bed maintenance and raising of seedlings.
  - c. Selection of materials for cutting preparation and selection of cuttings, planting and raising of saplings in nursery beds and polythene bags. Selection and grading of saplings.
9. Farm implements and Machinery
10. Identification of common weeds of mulberry and weeding
11. Visits to Govt. Silk farm and individual interaction with silkworm growers .
12. Viva-voce.

### **Distribution of 50 marks of Internal Assessment Practicals under CBCS**

1. Daily evaluation of Practical records and Internal Practical Test: **30 Marks**

Marks obtained on the basis of day to day performance  
in the lab/field = **15 marks**

Further distribution of marks on the basis of grades:

$$\alpha = 9/10$$

$$\beta = 7/10$$

$$\gamma = 5/10$$

To be converted out of 15 marks.

Internal Practical Test= **15 Marks**

2. Marks of Attendance

**: 10 Marks**

Distribution:

<75% = 0 marks

75%-80% = 6 marks

81- 90% = 8 marks

91%-100% = 10 marks

3. Viva-voce

**: 10 Marks**

**Total=50 marks**

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## SERICULTURE

### SEMESTER-II

#### EXAMINATION TO BE HELD IN THE YEARS MAY 2017, 2018, 2019 UNDER CHOICE BASED CREDIT SYSTEM

Course No. USETC201

Credit: 04

Course Title: Biology of mulberry and silkworm rearing  
technology

Duration: 3 Hours

Maximum Marks: 100

Theory Examination: 80

Internal Assessment: 20

There shall be a Semester End Examination for theory and practical papers of 100 marks each. 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 50 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

**13 Hours**

- 1.1 Taxonomy of mulberry and popular mulberry cultivators; Morphology and anatomy of mulberry stem, root and leaf. An outline of floral biology of mulberry flower, fruit and seed development. Mulberry the "Kalpa Vriksha" the economical importance.
- 1.2 Propagation of mulberry; seedling methods of raising viable seeds, saplings, preparation and selection of cuttings.  
  
Grafting stem root and bud grafting techniques, layering, raising of nursery, its maintenance and care, use of growth regulators in mulberry propagation.
- 1.3 Mulberry farm; Bush, Middling's and low trees.
- 1.4 Selection and preparation of site, soil testing and soil improvement methods, plot size, orientation and layout, selection of varieties for cultivation, planting system, row system and pot system. Advantages and Disadvantages and recommended system. Spacing for mulberry and its significance in leaf productivity and quality under various field conditions.

#### UNIT II

**12 Hours**

- 2.1 Irrigated conditions: Water requirement for mulberry and different field situations and seasons, over irrigation and its effects.



- 2.2 Manures and their applications: Vermiculture, organic manures type (FYM and Compost) Fertilizers; types, importance, application methods and limitations.
- 2.3 Chemical fertilizers: Role of major nutrients and trace elements growth. Types (straight, complex and complete fertilizers) important chemical fertilizers in mulberry cultivation, Common weeds of mulberry, their effect on mulberry productivity and control measures.
- 2.4 Pruning and Training; Objectives. Types and methods of pruning, its importance.  
Harvesting: Effects of harvest on mulberry plant, harvesting methods (leaf and shoot harvest) in relation to cultivation and pruning practices. Time of harvest, transportation and preservation methods.
- 2.5 Mulberry Management: Significance of leaf cocoon ratio concept, exclusive mulberry garden for chawki rearing, concept and methods.

### **UNIT-III**

**13 Hours**

- 3.1 Systematic position of silkworm and salient features of order Lepidoptera, Silk worm races and Geographical, distribution.
- 3.2 Life history of *Bombyx mori*; morphology of egg, larva, pupa and adult, Morphology and anatomy of organ systems in silkworm mouth parts, digestive system and reproductive system. Silk gland-divisions, spinneret, silk protein and their synthesis.  
Moulting; formation and shedding of cuticle, hormonal control.
- 3.3 Metamorphosis and the role of hormones in insect metamorphosis
- 3.4 Structure of egg development and hatching.  
Nutrition: Factors influencing Silkworm growth and development.

### **UNIT IV**

**13 Hours**

- 4.1 Rearing house-Requirement for ideal rearing house- selection of site and size of rearing house. Orientation-Model of rearing house. CSB model-Advantage and disadvantages of different rearing houses.
- 4.2 Disinfections-importance of disinfections, different disinfectants, disinfectants and their concentrations and formulation for application.
- 4.3 Selection of silkworms races/breeds for rearing-advantages and disadvantages of bivoltine, multivoltine and their hybrids.  
Estimation of leaf quality and yield-appropriate time for estimation of leaf yield.
- 4.4 Incubation-definition-environmental conditions required for incubation and their influence on egg development-methods of incubation-conventional method, incubator and low cost incubation devices.
- 4.5 Preparation or brushing, what is brushing, different brushing methods, egg and sheet eggs-tapping and net method -Selection of leaf for brushing, advantages and disadvantages of different types or brushing.

## UNIT-V

13 Hours

- 5.1 Harvesting of leaf-methods and time of harvesting-transportation and storages of leaf for chawki and late age worms.
- 5.2 Chawki rearing-importance-environment conditions required for chawki rearing- leaf requirement and selection and different chawki rearing methods. Moulting: Symptoms and moulting care during pre-moulting, moulting and post moulting periods. .
- 5.3 Late-age rearing-Spacing and leaf requirement-environmental Conditions required, frequency of feeding, bed cleaning schedules. Different rearing methods-shelf, shoot and floor rearing-Advantages and disadvantages. .
- 5.4 Preparation for mounting-Methods of mounting, types of mountages- Advantages and disadvantages of their use, spinning-environmental conditions required for spinning.
- 5.5 Harvesting of Cocoons-time of harvest of seed crop, hybrid crop, sorting of Cocoons; preservation-transportation of Cocoons.

### **NOTE FOR PAPER SETTING**

The question paper will have two sections. Section 'I' will be compulsory having ten questions of 2 marks each from whole of the syllabus. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

### **Distribution of 20 Marks of Internal Assessment under CBCS:**

Internal Assessment Test : 20 Marks ( Pattern: One long answer type question of 10 marks & Five short answer type questions of 2 marks each)

Syllabus to be covered in the examination: Upto 50%

Time allotted : 1 hour

### **B.OOKS RECOMMENDED**

1. P .L.Jaiswal, *et.a/* 1980, Hand book of Agriculture, ICAR, New Delhi.
2. R.,F. Daubenmure, 1970. Plants and environment, Wiley Eastee, I.CAR, New Delhi, 1985. -
3. IAEA, 1974, Polyploidy and Induced mutations in plant breedings; international Atomic Energy Agency, Vienna.
4. HURD, 1976, Plant breeding for drought resistance in: water deficits and plant. growth vol. 4(ed) T.T. Kozlowski, Academic Press, New York.

5. 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 Delhi. .
6. Van der Plank, J.E. 1968, Disease resistance in plants Academic Press New York
7. FAOManual-I Mulberry cultivation, Fac, Rome.
8. Boraiah, S. 1986. Mulberry Cultivation. Lectures on Sericulture.
9. Mather, K, and Jinks, J.L. 1977 introduction to Biometrical Genetics, Chapman and Halt
10. Singh B.D, Fundamentals of Genetics: Kalyani Publishers. New Delhi.
11. Swanson, C.P. 1957, Cytology and Cytogenetics. Prentice Hall, Eagle-wood Clifff .New Jersey.
12. Strickberger, M.W. 1976. Genetics, Macmillan Publ. Co. Inc. New York.
13. CSB. .1990. Genes and Genotypes in the Germplasm bank ( a report of the committee for the fixation of norms).
14. Eeltwell, J. The Story of ' Silk. Alan Sutton Pub. Phoenix Mill. Hipivrdyrdjotr.1990.
15. Dandin *et.al.* 1988 Bibliography on mulberry (1900-1984) CSR &TI, (Central Silk Board) Mysore: .
16. Manual of Sericulture: food and Agriculture Organization Rome I 1976.
17. Appropriate Sericultural Techniques ed. M.S. Jolly, Director, CSR&TI, Mysore
18. Handbook of Practical Sericulture, S.R.Ullal and M.N. Narasihanna, CSB, Banglore, 1987.
19. Text book of Tropical Sericulture, Pub. Japan Overseas Corporation Volunteers, 1975.
20. Handbook on Silkworm Rearing: Agriculture and Technical Manual-I, Fuzi Pub. Co. Ltd. Japan 1972.
21. Manual on Silkworm egg production: M.N Narasimhanna, Pub. By CSB, Banglore, 1988.
22. Silkworm rearing: Vuoang-Chun and Chen Da-Chung; Pub. By FAO, Rome, 1988
23. A guide for bivoltine Sericulture; K.Sengupta, Director, CSR & IT, Mysore, 1989.
24. New technology of Silkworm Rearing: S.Krishnaswamy, Reprinted by CSB, Banglore 1989. ,
25. Improved method of rearing young age silkworms: S. Kirshnaswamy, Reprinted by CSB Banglore,
26. The Principles of Insect physiology: V.B. Wigglesworth: Pub. By English Language book Soc., Chapman & Hal, 1972.
27. Economics of sericulture under irrigation conditions: M.S. Jolly, CSR & TI, Mysore- 8,1982.
28. Economics of Sericulture under Rain fed conditions, M.S.Jolly, CSR & TI. Mysore, 1982.
29. The Silkworm-an important laboratory tool, ed. By Y.Tazima, Kodansna, Japan.

30. Silk from grub to glamour: Mahesh M.Nanavathy, Pub. In Indian Paramount House, Bombay, 1965
31. Principles of Insect Morphology: R.E.Snodgrass, Tata McGraw Hill Pub. Co. Ltd. : Bombay, 1935.
32. Insect Biology in the future, VBW BO, Ed by Michael Locke, David S. Smith, Academic Press, 1980.
33. Silkworm Biology and Rearing, A.K.Dhole, Project Coordinator, NCERT, New Delhi, 1990.
34. An Introduction to sericulture, Ganga G. and J. Sulochana Shetty-Oxford and IBH .Pub. 1991.
35. China Sericulture, 1972, FAO, Rome.
36. Silkworm Rearing and Diseases of Silkworm, 1956, Ptd. By Director of Ptg. Stn, & Pub. Govt. Press, Bangalore.
37. Choebyong Hone 1972; Sericultural. Technology, Pvt. By Seoul National University Press, Korea.
38. Silkworm Rearing Techniques in Tropics; Seinosuka Omura, 1973, OTCA, Tokyo, .Japan.
39. Sericology, Tanaka, Y. 1964, CSS Pub, Bangalore.
40. Synthesised Science of Sericulture, Yokoyama, 19.54, Pub. With permission of Sugimani -KO, Tokyo.
41. Handbook of Sericulture-I; Yonemua, M and Rama Rao, N.1925. Mysore govt. Ptg. Press.
42. Cytoplasmic polyhedrosis Virus of the Silkworm, Hissa Aruga and Tanada, Y, 1971, Univ. of Tokyo Press, Japan.

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## SERICULTURE

### SEMESTER-II

**Course No. USEPC201**

**Duration: 3 Hours**

**Credit: 02**

**Course Title: Practical**

**Maximum Marks: 100**

**External: 50**

**Internal: 50**

**64 Hours**

1. Morphology of Larva, pupa and moth
  - (a) mouth parts of silkworm
  - (b) External morphology of larva pupa and moth
  - (c) Sex separation of larva, pupa and moth
2. Anatomy -
  - a. digestive system, excretory system, and Respiratory system in silkworm
  - b. Silk glands in silkworm.
  - c) Reproductive system in silk moth
3. Cocoon characters of popular uni, bi, and multi voltine races
4. Model rearing house-types of rearing houses
5. Rearing appliances
6. Disinfection-Types of disinfectants, effective concentration of disinfectants, preparation of disinfectants. .
7. Incubation of silkworm eggs- black boxing, percentage of hatching, recording of temperature and humidity.
8. Identification of different types of fertilizers, calculation of dosages (extensive Preparation of compost
9. Estimation of leaf yield, moisture contents and harvesting methods.

10. Mulberry leaf estimation -Harvesting and preservation techniques -leaf selection for different instars.
11. Moulting -identification of moulting, larvae, moulting care
12. Mountages and harvesting, cocoon assessment and preparation of harvest report.
13. Visit to local progressive sericulturists.
14. Rearing of silkworms (Compulsory)
15. Viva-voce.

**Distribution of 50 marks of Internal Assessment Practicals under CBCS**

1. Daily evaluation of Practical records and Internal Practical Test: **30 Marks**

Marks obtained on the basis of day to day performance  
in the lab/field = **15 marks**

Further distribution of marks on the basis of grades:

$\alpha = 9/10$

$\beta = 7/10$

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To be converted out of 15 marks.

Internal Practical Test= **15 Marks**

2. Marks of Attendance : **10 Marks**

Distribution:

<75% = 0 marks

75%-80% = 6 marks

81- 90% = 8 marks

91%-100% = 10 marks

3. Viva-voce : **10 Marks**

**Total=50 marks**

