YUVARAJA'S College

University of Mysore

(National Education Policy – 2020)

III and IV Semesters Syllabus for Undergraduate Program

B.Sc. (Basic/Hons.)

in

SERICULTURE

DEPARTMENT OF SERICULTURE

YUVARAJA'S COLLEGE

MYSURU – 570 005

(2022-2023)

Assessment:

Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA	Summative Assessment (Written Exam)
Theory	**40%**	**60%**
Practical	**50%**	**50%**
Projects	**50%**	**50%**
Experiential Learning (Internships / MOOC / SWAYAM etc.)	**40%**	**60%**

Formative Assessment		
Assessment Occasion/ type	**Weight age in Marks**	
	Theory	**Practical**
Test (1)	20 Marks	15 Marks
Assignment	10 Marks	05 Marks
Field work/Visit	10 Marks	05 Marks
Total	40 Marks	25 Marks

SEMESTER 3

Title of the Courses

Course 5: DSC-3T, SER-103T, Silkworm Biology and Rearing TechnologyCourse 6: OE-3T, Silkworm Rearing Technology

Course 5 : DSC-3T, SRC 103T **Silkworm Biology and Rearing Technology**		**Course 6:** OE- 3T **Silkworm Rearing Technology**	
Number of Theory Credits	**Number of lecture hours/semester**	**Number of Theory Credits**	**Number of lecture Hours / semester**
4	**56**	**3**	**42**

Course -5: DSC-3T, SER-103T
Silkworm Biology and Rearing Technology

Sl. No.	**Course -5: DSC-3T, SER-103T, Silkworm Biology and Rearing Technology**	**56 hrs**
	Unit-1	**14hrs**
1	Classification of sericigenous insects. Characteristic features of The order Lepidoptera and families - *Saturnidae* and *Bombycidae*.	4 hrs.
2	Classification of silkworm breeds based on moultinism, voltinism and geographical distribution.	4 hrs.
3	Popular silkworm breeds and hybrids of Karnataka and their economic traits.	2 hrs.
4	Life cycle of *Bombyx mori* L. Morphology of egg, larva, pupa and adult of *B. mori.*	4 hrs.
	Unit-2	**14hrs**
5	Spermatogenesis, oogenesis and fertilization in the silkworm, *B. mori.*	4 hrs.
6	Anatomy: digestive, circulatory, excretory, respiratory and nervous system of *B. mori* larva.	5 hrs.
7	Anatomy of reproductive systems of *B. mori*.	3 hrs.
8	Anatomy of silk glands of *B. mori*.	2 hrs.
	Unit-3	**14hrs**
9	Rearing house: Location, orientation, plan and utilities. Model and low-cost rearing houses.	3hrs.
10	Rearing appliances - shelf and shoot rearing, requirements of rearing appliances for 100 dfls.	2 hrs.
11	Disinfection of rearing house and rearing appliances. Disinfectants - rearing room and rearing bed. Hygiene – personal and rearing house.	2 hrs.
12	Selection of silkworm races/breeds for rearing. Advantages and disadvantages of bivoltine and multivoltine pure races/ breeds and hybrids rearing.	2 hrs.

13	Incubation: definition, methods and devices. Black boxing and its importance.	3 hrs.
14	Brushing of silkworm - Definition, types and care during brushing.	2 hrs.
Unit-4		**14hrs**
15	Chawki rearing: Characteristics of young age worms. Types of chawki rearing –traditional and advanced methods. Feeding- methods, frequency and quantity of feeding. Spacing. Methods of bed Cleaning. Optimum environmental conditions required forrearing of chawki worms. Moulting- symptoms and care during moulting.	4hrs.
16	Late age silkworm rearing: Characteristics of adult worms. Methods of rearing - merits and demerits. Methods, frequency and quantity of feeding. Spacing. Methods of bed cleaning. Optimum environmental conditions required for rearing of late age silkworms. Moulting - symptoms and care during moulting.	4hrs.
17	Spinning: Identification of ripened larvae; mounting and density; Types of mountages and their advantages and disadvantages. Environmental requirementsduring spinning.	3hrs.
18	Harvesting - time of harvesting. Sorting, storage/ preservation, packaging and transport of cocoons; leaf-cocoon ratio; maintenance of rearing records.	3hrs.

Course 5: DSC-3P, SER-103P, Silkworm Biology and Rearing Technology

1	Life cycle of *Bombyx mori*. Morphology of egg, larva, pupa and adult of *Bombyxmori.*
2	Sex separation in larva, pupa and adult of the silkworm, *B. mori.*
3	Dissection and display of Digestive system of *B. mori* larva.
4	Dissection and display of Nervous system of *B. mori* larva
5	Dissection and display of Reproductive system of male and female *B. mori* moths.
6	Dissection and display of Silk glands in *B. mori*.
7	Mounting of *B. mori* larval mouth parts.
8	Identification of different breeds/hybrids of silkworm cocoons- NB_4D_2, KA, PM, C. Nichi, Nistari, CSR_2 and CSR_4 race/ breeds characters. Identification of mutants ofsilkworm larva- zebra, ursa, knobbed and sex-limited Races.
9	Rearing houses - model rearing house and low-cost rearing houses. Rearing appliances and their uses.
10	Disinfection - Types of disinfectants, concentration and dosage requirement. Preparation and spray of disinfectants to the rearing house and bed disinfectants.
11	Incubation of silkworm eggs. Black boxing. Calculation of Hatching percentage.
12	Rearing of Chawki silkworms: Brushing of newly hatched silkworm larvae – feeding and spacing. Bed cleaning using bed cleaning net. Identification of moulting larvae.

13	Rearing of Late age silkworms: Feeding and spacing, bed cleaning using bed cleaning net. Identification of moulting larvae.
14	Mounting and mounting density; Types of mountages.

SCHEME OF PRACTICAL EXAMINATION		
Duration-3 hrs.		**Max. Marks-25**
Q1	Dissection – Any one	9 marks
	Note: Distribution of marks.	
	a) Dissect and Display - 5 b) Neat labeled diagram with description - 4	
Q2	Hatching Percentage / any one of the rearing operations/disinfection for demonstration	8 marks
	Note: Distribution of marks	
	a) To conduct experiment - 4 b) Explanation with calculation - 4	
Q3	Identify and comment on the spots A, B, C and D. (any four from the practical syllabus/2marks for each)	8 marks

REFERENCES

1. Boraiah, G. (1994) *Lectures on Sericulture*. SBS Publishers, Bangalore.
2. Chapman,R.F. (1998) The Insects-Structure and Function. Cambridge University Press, UK.
3. Dandin, S.B.; Jayant Jayaswal and Giridhar, K. (Eds.) (2003) *Handbook ofSericulture Technologies*. CSB, Bangalore.
4. Dandin, S.B. and Giridhar, K. (Eds.) (2014) *Handbook of Sericulture Technologies*. CSB, Bangalore.
5. Govindan, R.; Chinnaswamy, K.P.; R.; Krishnaprasad, N.K. and Reddy, D.N.R. (2000) *Advances in Tropical Sericulture*. *Vol. 4 – Proceedings of NSTS – 1999,* UAS, Bangalore.
6. Hiroo and Sibuya-ku (1975) *Textbook of Tropical Sericulture.* Japan Overseas Corporation Volunteers, Tokyo, Japan.
7. Jolly, M.S. (1987) *Appropriate Sericulture Techniques.* Published by International Centre for Training and Research in Tropical Sericulture, Mysore.
8. Krishnaswami, S.; Narasimhanna, M.N.; Suryanarayan, S.K and Kumararaj, S. (1973) *Sericulture Manual-2 - Silkworm Rearing.* Agriculture Service Bulletin, FAO, Rome.
9. Madan Mohan Rao, M. (1999) *Comprehensive Sericulture Manual*. PS Publications,Hyderabad.
10. Omura, S. (1973) *Silkworm Rearing Techniques in Tropics*. Overseas

Technical Co-operation Agency, Tokyo, Japan

11. Rajan, R.K. and Himantharaj, H.T. (2005) *Silkworm Rearing Technology.* Central SilkBoard, Bangalore.

12. Tazima, Y. (1972) *Handbook of Silkworm Rearing.* Fuji Pub.Co. Ltd., Tokyo, Japan.

Course 6: OE-3T, Silkworm Rearing Technology

Sl. No.	OE-3T, Silkworm Rearing Technology	42 Hrs.
	Unit – I	**14hrs.**
1	Introduction to silkworm rearing. Types of silks - mulberry and non-mulberry. Popular mulberry silkworm breeds and hybrids of Karnataka.	3 hrs.
2	Planning for silkworm rearing: Estimation of leaf yield and quality; brushing capacity; selection of silkworm races / breeds and hybrids.	3 hrs.
3	Rearing houses: Types, location and orientation; rearing houses for young (chawki) and grown up (late-age) silkworms; rearing appliances and theiruses.	4 hrs.
4	Disinfection and hygiene: Importance, types of disinfectants, preparation ofspray solution, quantum of spray solution required, disinfection method, mode of action of disinfectants and hygiene practices in silkworm rearing.	4 hrs.
	Unit-II	**14 hrs.**
5	Chawki silkworm rearing: Rearing methods and operations; chawki rearing centres – importance and functions.	6 hrs.
6	Late age silkworm rearing: Rearing methods and operations.	6 hrs.
7	Moulting: Characteristic features - before, at and after moult; care during moulting.	2 hrs.
	Unit – III	**14 hrs.**
8	Mounting - Types of mountages, density of mounting, environmental conditions during spinning.	5 hrs.
9	Cocoon harvesting, sorting, packing, transportation and marketing.	4 hrs.
10	Environmental requirements for silkworm egg incubation, young and late-age silkworm rearing.	3 hrs.
11.	By-products of silkworm rearing and their utilization.	2 hrs.

REFERENCES

1. Boraiah, G. (1994). *Lectures on Sericulture*. SBS Publishers, Bangalore.
2. Dandin, S.B.; Jayant Jayaswal and Giridhar, K. (Eds.) (2003) *Handbook ofSericulture Technologies.* CSB, Bangalore.
3. Dandin, S.B. and Giridhar, K. (Eds.) (2014) *Handbook of Sericulture Technologies*.CSB, Bangalore.
4. Govindan, R.; Chinnaswamy, K.P.; R.; Krishnaprasad, N.K. and Reddy, D.N.R. (2000) *Advances in Tropical Sericulture. Vol. 4 – Proceedings of NSTS – 1999,* UAS, Bangalore.
5. Hiroo and Sibuya-ku (1975) *Textbook of Tropical Sericulture.* Japan Overseas Corporation Volunteers, Tokyo, Japan.
6. Jolly, M.S. (1987) *Appropriate Sericulture Techniques.* Published by International Centre for Training and Research in Tropical Sericulture, Mysore.
7. Krishnaswami, S.; Narasimhanna, M.N.; Suryanarayan, S.K and Kumararaj, S. (1973) *Sericulture Manual-2 - Silkworm Rearing.* Agriculture Service Bulletin, FAO, Rome.
8. Omura, S. (1973) *Silkworm Rearing Techniques in Tropics*. Overseas Technical Co-operation Agency, Tokyo, Japan
9. Rajan, R.K. and Himantharaj, H.T. (2005) *Silkworm Rearing Technology.* Central SilkBoard, Bangalore.
10. Tazima, Y. (1972) *Handbook of Silkworm Rearing.* Fuji Pub.Co. Ltd., Tokyo, Japan.

Semester 4

Title of the Courses
Course 7: DSC-4T, SER-104T, Mulberry and Silkworm Crop Protection
Course 8: OE-4, Textile Technology

Course 7: DSC-4T, SER-104T, Mulberry and Silkworm Crop Protection		Course 8: OE-4, Textile Technology	
Number of Theory Credits	**Number of lecture hours/semester**	**Number of Theory Credits**	**Number of lecture hours/semester**
4	**56**	**3**	**42**

Course 7: DSC-4T, SER-104T, Mulberry and Silkworm Crop Protection

Sl. No.	Course 7: DSC-4T, SER-104T Mulberry and Silkworm Crop Protection	56 hrs
	Unit - 1	**14hrs**
1.	Introduction to plant diseases and importance of plant protection.	2 hrs.
2.	Influence of biotic and abiotic factors on the incidence of plant diseases.	2 hrs.
3.	Classification of mulberry diseases.	1 hrs.
4.	Fungal diseases of mulberry : Causal organism, Classification, Occurrence,symptoms, etiology, preventive and control measures - Powdery mildew, Leaf spot, Leaf rust, Leaf blight and Root rot.	5 hrs.
5.	Root-knot mulberry : Causal organism, Classification, Occurrence, symptoms,preventive and control measures.	1 hrs.
6.	Viral, bacterial and dwarf diseases of mulberry : Causal organism, Classification, occurrence, symptoms, preventive and control measures.	2 hrs.
7.	Mineral deficiency symptoms and remedial measures in mulberry.	1 hrs.
	Unit - 2	**14hrs**
8.	Pest: Definition; categories of pest and ways of infestation; pest outbreak; pest forecasting and forewarning. Concept and strategies of pest management.	2 hrs.
9.	Major pests : leaf roller, Bihar hairy caterpillar, mealy bug, scale insect and thrips. Their damage and preventive and control measures.	4 hrs.
10.	Minor pests: grass hopper, stem girdlers, termites, May and June beetles, Jassids and mites. Their damage and Preventive and control measures.	4 hrs.
11.	Pesticides: Forms, formulations, calculation and application; Different types of sprayers.	2 hrs.
12	Integrated pest management.	2 hrs.
	Unit - 3	**14hrs**
13.	Introduction to silkworm pathology. Classification of silkworm diseases.	1 hrs.

14.	Protozoan disease : symptomatology, life cycle of *Nosema bombycis*, structureof pebrine spore, source, mode of infection and transmission, cross infectivity, prevention and control.	3 hrs.
15.	Bacterial diseases : causative agents, symptoms, factors influencing flacherie, source, mode of infection and transmission, prevention and control.	3 hrs.
16.	Viral diseases : grasserie, infectious flacherie, cytoplasmic polyhedrosis, densonucleosis and gattine. Causative agents, symptoms, mode of infection and transmission, prevention and control.	3 hrs.
17.	Fungal diseases : white muscardine, green muscardine and aspergillosis -causative agents, symptoms, structure and life cycle of fungal pathogen, mode of infection and transmission, prevention and control.	4 hrs.
Unit-4		**14hrs**
18.	Integrated management of silkworm diseases.	2 hrs.
19.	Uzi fly : Classification, life cycle and morphology of Indian uzifly, seasonal occurrence, nature and extent of damage, prevention and control.	2 hrs.
20.	Cocoon pests of silkworm: Dermestid beetle - life cycle, nature and extent of damage, prevention and control measures.	2 hrs.
21.	Predators of silkworm: Cockroaches, ants, lizards, Birds and rodents. Theirdamage, prevention and control measures.	4 hrs.
22.	Brief account of methods of pest control: Cultural, mechanical, physical, legislative (Quarantine), chemical, genetical / autocidal, biological and IPM.	4 hrs.

Course 7: DSC-4P, SER-104P, Mulberry and Silkworm Crop Protection

1	Study of powdery mildew through sectioning, staining and temporary mounting.
2	Study of leaf spot through sectioning, staining and temporary mounting.
3	Study of leaf rust through sectioning, staining and temporary mounting.
4	Study of root-knot nematode in mulberry through sectioning, staining and temporary mounting.
5	Identification of mulberry pests : Leaf roller, Bihar hairy caterpillar, scale insect, mealy bug, thrips, beetles, jassids and grasshoppers etc.,
6	Study of pesticides, their formulation, applicators (sprayers and dusters).
7	Identification of diseased silkworms based on symptoms. Preparation of temporary slides of bacteria.
8	Identification of diseased silkworms based on symptoms. Preparation of temporary slides of pebrine spores.
9	Identification of diseased silkworms based on symptoms. Preparation of temporary slides of nuclear polyhedral bodies.
10	Identification of diseased silkworms based on symptoms. Preparation of temporary slides of mycelial mat and spores of muscardine.

11	Methods of application of silkworm bed disinfectants for management of silkworm diseases.
12	Life cycle of Uzi fly; Identification of uzi-infested silkworms and cocoons.
13	Life cycle of dermestid beetles: Dermestid beetle infested silkworm cocoons
14	Predators of silkworm *B. mori*.

SCHEME OF PRACTICAL EXAMINATION		
Duration-3 hrs.		**Max. Marks-25**
Q1	Preparation of any one of the mulberry pathogen	9 marks
	Note: Distribution of marks	
	a) Procedure -2 b) Labeled diagram with explanation - 3 c) Preparation of slide - 3 d) Identification - 1	
Q2	Preparation of any one of the silkworm pathogen	8 marks
	Note: Distribution of marks	
	a) Procedure -2 b) Labeled diagram with explanation - 3 c) Preparation of slide - 2 d) Identification - 1	
Q3	Identify and comment on the spots A, B, C and D. (any four from the practical syllabus/ 2 marks for each)	8 marks

REFERENCES

1. Boraiah, G. (1994) *Lectures on Sericulture*. SBS Publishers, Bangalore.
2. Borror, D. J and Delong, D. M. (1960) *Introduction to of Insects*. Holt, New York.
3. Dube, H.C. (1992) *A Textbook of Fungi, Bacteria and Viruses*. Vikas Publishing House Pvt. Ltd., New Delhi.
4. Govindaiah, Gupta, V.P., Sharma, D.D., Rajadurai, S. and Nishitha Naik (2005) *Mulberry Crop Protection.* Central Silk Board, Bangalore.
5. Govindan, R.; Narayanaswamy, T.K. and Devaiah, M.C. (1998) *Principles of Silkworm Pathology.* Seri Scientific Publishers, Bangalore.
6. Govindan, R.; Ramakrishna Naika and Sannappa, B. (2004) *Advances in Disease and Pest Management in Sericulture*. Seri Scientific Publishers, Bangalore.
7. Govindan, R.; Ramakrishna Naika and Sannappa, B. (2004) *Progress of Research on Disease and Pest Management in Sericulture*. Seri Scientific Publishers, Bangalore.
8. Huang, E. (2003) *Protection of Mulberry Plants*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi and Calcutta.
9. Nataraju, B., Sathyaprasad, K., Manjunath, D. and Aswani Kumar, C. (2005) *Silkworm Crop Protection.* Central Silk Board, Bangalore.
10. Rangaswami, G. (1996) *Diseases of Crop Plants in India*. Prentice Hall of India Pvt. Ltd., New Delhi.
11. Reddy, D.N.R. and Narayanaswamy, K.C. (2003) *Pests of Mulberry*. Zen Publishers, Bangalore.
12. Sengupta, K.; Kumar, P.; Baig, M. and Govindaiah (1990) *Handbook on Pest and Disease Control of Mulberry and Silkworm*. ESCAP, UN, Thailand.
13. Singh, R.N.; Samson, M.V. and Datta, R.K. (2000) *Pest Management in Sericulture*. Indian Publishers, Delhi.
14. Steinhaus, E.A. (1963) *Insect Pathology: An Advanced Treatise* – Vol. 1-2. Academic Press, New York and London.
15. Sukumar, J.; Dandin, S.B. and Bongale, U.D (1994) *Mulberry Disease and Management.* KSSRDI, Bangalore.
16. Trivedi, P.C. (Ed.) (2001) *Plant Pathology.* Pointer Publishers, Jaipur, India.

Course 8: OE-4, Textile Technology

Sl. No.	OE-4, Textile Technology	42 hrs.
	Unit-I	**14 hrs.**
1	Introduction to textile fibres. Classification of fibres – natural and Manmade fibres.	2 hrs.
2	Cocoon sorting; stifling, different cocoon cooking methods.	6 hrs.
3	Reeling: different reeling instruments; reeling on charaka, cottage basin, multi-end, semi-automatic and automatic reeling machines.	6 hrs.
	Unit-II	**14hrs.**
4	Silk Throwing.	4 hrs.
5	Weaving: Preparation for weaving, warp preparation, pirn winding, weaving on handloom and power loom.	2 hrs.
6	Degumming and bleaching of silk.	4 hrs.
7	Dyeing: types of dyes, dyeing methods, tests to determine colourfastness	4 hrs.
	Unit-III	**14hrs.**
8	Dyes used for printing, methods of printing and booking.	2 hrs.
9	Major natural fibres ; Cotton, linen, wool, Nylon, polyester and silk – their history and characteristic features.	4 hrs.
10	Minor natural fibres: Vegetable and mineral fibres and their characteristic features.	2 hrs.
11	Spun silk production and uses.	4 hrs.
12	Comparative characteristics of natural and manmade fibres.	2 hrs.

REFERENCES

1. Huang, G. R. (1998) *Silk Reeling.* Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi and Calcutta.
2. Krishnaswami, S.; Madhava Rao, N.R.; Suryanarayan, S.K and Sundaramurthy, T.S. (1972) *Sericulture Manual - 3 - Silk Reeling*. Agriculture Service Bulletin, FAO, Rome.
3. Mahadevappa, D.; Halliya, V.G.; Shankar, D.G. and Ravindra Bhandiwad (2000) *Mulberry Silk Reeling Technology*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi and Calcutta.
4. Yonemura, M. and Rama Rao, N. (1925) *Handook of Sericulture*. Mysore Government Branch Press.

-sd-
Dr.H.B.MAHESHA
CHAIRMAN
Board of Studies in Sericulture
Yuvaraja's College