

SERICULTURE III SEMESTER [S E P 2024-25]

PAPER III: MULBERRY AND SILKWORM CROP PROTECTION

Programme	B.Sc (Sericulture)
Course Title	Paper III: Mulberry and Silkworm Crop Protection (Theory)
Course code	SERT 301
Total Hours of Teaching	56
Number of Teaching Hours / Week	4 Hours
Number of Credits	4
Formative Assessment	20
Summative Assessment	80

III SEMESTER

SERT 301: MULBERRY AND SILKWORM CROP PROTECTION Credits-4

Theory

56 hr.

Unit-I		
1.	Introduction to plant diseases and their classification.	1 hr.
2.	Influence of biotic and abiotic factors on the incidence of plant/mulberry diseases. Importance of plant protection.	2 hrs.
3.	Classification of mulberry diseases. Deficiency diseases of mulberry and their corrective measures.	3 hrs.
4.	Foliar and shoot diseases of mulberry - Powdery mildew, Leaf spot, Leaf rust, Leaf blight and stem canker: Occurrence, symptoms, etiology and preventive and control measures.	4 hrs.
5.	Root diseases of mulberry – Root knot and root rot: Occurrence, life cycle, symptoms and control measures.	2 hr.
6.	Viral, bacterial and dwarf diseases of mulberry: Occurrence, symptoms and preventive measures.	2 hrs.

Unit-II		
7.	Pest: Definition, origin, outbreak and forecasting.	3 hrs.
8.	Major pests: Leaf roller, Bihar hairy caterpillar, mealy bug and thrips – life cycle, nature of damage and their preventive measures.	4 hrs.
9.	Minor pests: Girdlers, termites and mites - life cycle, nature of damage and their preventive and control measures.	4 hrs.
10.	Pesticides: Forms, formulations, calculation and application.	3 hrs.
Unit-III		
11.	Introduction and classification of silkworm diseases.	1 hr.
12.	Protozoan disease – symptomatology, structure of pebrine spore, life cycle of <i>Nosema bombycis</i> , source, mode of infection and transmission, cross infectivity, prevention and control.	3 hrs.
13.	Bacterial diseases - causative agents, symptoms, factors influencing flacherie, source, mode of infection and transmission, prevention and control.	5 hrs.
14.	Viral diseases (grasserie, infectious flacherie, cytoplasmic polyhedrosis, denonucleosis and gattine)-causative agents- symptoms – sources, mode of infection and transmission-prevention and control.	5 hrs.
Unit-IV		
15.	Fungal diseases: White and green muscardine and aspergillosis- causative agents-symptoms - structure and life cycle of fungal pathogen- mode of infection and transmission- prevention and control.	4 hrs.
16.	Life cycle of Indian uzifly; seasonal occurrence, oviposition and host-age preference; nature and extent of damage; prevention and control; integrated management of Indian uzifly.	3 hrs.
17.	Pests of cocoons: Dermestid beetle - life cycle; nature and extent of damage; Prevention and control measures.	2 hrs.
18.	Predators of silkworm: Cockroaches, ants, lizards and rodents; prevention and control measures.	2 hrs.
19.	Integrated management of diseases and pests of mulberry and silkworm.	3 hrs.

Formative Assessment for Theory		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

SERICULTURE III SEMESTER
PAPER III: MULBERRY AND SILKWORM CROP PROTECTION

Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: Draw neat labeled diagrams wherever necessary

Section-A

I. Answer any TEN of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Section-B

II. Answer any SIX of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Section-C

III. Answer any THREE of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

Practical**12 Practicals of 4 hr. each**

1.	Study of powdery mildew, leaf spot and leaf rust of mulberry – sectioning, staining and mounting of pathogen.	2 Prac.
2.	Study of root-knot and root rot in mulberry.	1 Prac.
3.	Collection, mounting/preservation of insect pests of mulberry.	1 Prac.
4.	Identification of mulberry pests and nature of damage of the following pests: leaf roller, Bihar hairy caterpillar, scale insect, mealy bug, thrips, beetles, jassids and grasshoppers.	1 Prac.
5.	Study of pesticides: Formulations and applicators (sprayers and dusters)	1 Prac.
6.	Identification and staining of bacteria and pebrine spore,	1 Prac.
7.	Identification and staining of polyhedra of nuclear polyhedrosis and mycelial mat/spores of muscardine.	2 Prac.
8.	Methods of application of silkworm bed disinfectants for management of silkworm diseases.	1 Prac.
9.	Life cycle of Uzi fly; Identification of uzi-infested silkworms and cocoons.	1 Prac.
10.	Life cycle of dermestid beetles: Dermestid beetle infested silkworm cocoons and estimation of incidence. Identification of predators of silkworm.	1 Prac.

SCHEME OF PRACTICAL EXAMINATION**Duration- 3 hrs.****Max. Marks – 40**

Q 1. Temporary mounting of any one of the following. - 10 marks

Leaf spot/ leaf rust/ powdery mildew/ root knot nematode of mulberry.

Note: Distribution of marks

- a) Identification with binomial nomenclature - 2
- b) Sectioning, staining and mounting - 5
- c) Labelled diagram with description - 3

Q 2. Temporary mounting of any one of the following. - 10 marks

Pebrine spore/ nuclear polyhedral bodies/ mycelia and conidial spores.

Note: Distribution of marks

- a) Identification - 2
- b) Staining and mounting - 5
- c) Procedure and diagram - 3

Q 3. Preparation of disinfectant and pesticides - 10 marks

Q 4. Identify and comment on the spots **A, B, C, D** and **E** (*Any five*) - 10 marks

III SEMESTER

ELECTIVE –1: SERE-100: APPLIED ENTOMOLOGY

Credits-3

Theory

36 hr.

Unit-I		
1	General characteristic features of insects. Insects in the service of man. Insects as enemies of man. Insect age, abundance and adaptations; causes for success of insects.	3hrs.
2	Salient features of insect orders with special reference to Lepidoptera, Diptera, Hymenoptera, Coleoptera, Homoptera and Neuroptera.	3hrs.
3	Collection and preservation of insects - methods, mounting and labeling.	1hr.
4	Metamorphosis in insects - ametabola, hemimetabola and holometabola.	2hrs.
5	Beneficial insects - silkworm, honeybee and lac insect – products and their uses; parasitoids and predators and their role in pest suppression; pollinators and their role in crop production.	2hrs.
6.	Insects as human food: Commonly eaten insects, nutritional value and advantages and problems of eating insects.	1hrs.
Unit-II		
7	Insects as important laboratory tools for scientific research - silkworm, fruit fly, house fly and mosquito. Insects in the service of forensic science.	2hrs.
8	Social insects - termites, honeybees, wasps and ants.	2hrs.
9	Insect pests: Definition, origin, and types, pest forecasting and outbreak.	2hrs.
10	Symptoms and injuries caused by insect pests; economic threshold and economic injury levels.	2hrs.
11	Insect pests of agricultural crops: Cereals, pulses, oilseeds and vegetables.	2hrs.
12	Insect pests of stored grains: Primary and secondary storage pests and their management.	2hrs.

Unit – III		
13	Insect pests of farm animals: Blood sucking flies, myiasis flies, lice and fleas; arachnids.	2hrs.
14	Insect pests of public health importance: Mosquitoes, house flies, sand flies, eye flies, lice, bed bugs and rat fleas.	2hrs.
15	Insect pests and their control: General considerations and prior information's.	1hrs.
16	Natural control of insect pests: Climatic factors, natural barriers, natural enemies and diseases	2hrs.
17	Applied control of insect pests: Cultural, mechanical, physical, chemical, biological, genetical/autocidal and legal methods.	2hrs.
18	Mass production of bio-control agents: parasitoids, predators and pathogens.	1hrs.
19	Integrated pest management – goals, principles and concepts, components and benefits.	2hrs.

SERICULTURE III SEMESTER
ELECTIVE –1 SERE-100: APPLIED ENTOMOLOGY
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: Draw neat labeled diagrams wherever necessary

Section-A

I. Answer any TEN of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Section-B

II. Answer any SIX of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Section-C

III. Answer any THREE of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

SERICULTURE IV SEMESTER [S E P 2024-25]

PAPER IV: MULBERRY AND SILKWORM PHYSIOLOGY

Programme	B.Sc (Sericulture)
Course Title	Paper IV: MULBERRY AND SILKWORM PHYSIOLOGY (Theory)
Course code	SERT 401
Total Hours of Teaching	56
Number of Teaching Hours / Week	4 Hours
Number of Credits	4
Formative Assessment	20
Summative Assessment	80

IV SEMESTER

SERT 401: MULBERRY AND SILKWORM PHYSIOLOGY

Credits-4

Theory

56 hr.

Unit –I		
1.	Absorption of water and solutes by roots; effect of external conditions; root pressure; ion exchange and active absorption.	4 hrs.
2.	Mineral nutrition- macro and micro nutrients; their physiological role	2 hrs.
3.	Transpiration: Significance; stomata- mechanism of opening and closing; regulation of water loss by stomata; factors influencing the rate of transpiration	4 hrs.
4.	Brief account of biological nitrogen fixation; types- importance in mulberry.	4 hrs.
Unit-II		
5.	Biochemical composition of mulberry leaf	2 hrs.
6.	Brief account of photosynthesis: Outline of the process; types of carbon fixation (C3 and C4); brief account of photorespiration and its significance.	5 hrs.

7.	Plant growth regulators: Importance and application in mulberry.	4 hrs.
8.	Role of environmental factors on mulberry growth and yield.	3 hrs.
Unit-III		
9.	Digestion: Nutritive requirements of the silkworm. Structure and function of digestive system; digestive enzyme; process of digestion.	5 hrs.
10.	Respiration: tracheal systems- spiracles, mechanism of respiration, factors affecting respiration.	5 hrs.
11.	Excretion: structure and function of excretory system and cryptonephridial arrangement and its significance in water regulation.	4 hrs.
Unit - IV		
12.	Neuro-endocrine system: Nervous system; Structure and distribution of endocrine gland; structure and functions.	3 hrs.
13.	Sense organs: Photoreceptors, Chemoreceptors and Mechanoreceptors.	3 hrs.
14.	Fertilization – embryonic development stages, organogenesis and egg hatching.	2 hrs.
15.	Muscle Physiology: Histology of insect muscles, flight muscles in insects, ultra structure of skeletal muscle, mechanism of muscle contraction	3 hrs.
16.	Integument: Structure, formation and function.	1 hr.
17.	Metamorphosis - types of insect metamorphosis.	2 hrs

Formative Assessment for Theory		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

SERICULTURE IV SEMESTER
PAPER IV: MULBERRY AND SILKWORM PHYSIOLOGY

Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: Draw neat labeled diagrams wherever necessary

Section-A

I. Answer any TEN of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Section-B

II. Answer any SIX of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Section-C

III. Answer any THREE of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

SERP 402: MULBERRY AND SILKWORMPHYSIOLOGY - Credits-2

Practical

12 Practicals of 4 hr. each

1.	Determination of stomatal size and index	1 Prac.
2.	Kranz Anatomy in relation to photosynthesis.	1 Prac.
3.	Separation of photosynthetic pigments from mulberry leaf by paper chromatography.	1 Prac.
4.	Determination of water potential of potato tubers.	1 Prac.
5.	Estimation of leaf moisture retention capacity of mulberry varieties.	1 Prac.
6.	Estimation of mulberry leaf protein content by Biuret method.	1 Prac.
7.	Estimation of total protein content in haemolymph of silkworm	1 Prac.
8.	Estimation of fat body glycogen content in silkworm	1 Prac.
9.	Estimation of glucose content in silkworm by DNS method	1 Prac.
10.	Estimation of carbohydrate content in silkworm.	1 Prac.
11.	Estimation of amylase activity levels in silkworm	1 Prac.
12.	Estimation of SDH activity levels in silkworm.	1 Prac.

SCHEME OF PRACTICAL EXAMINATION

Duration-3 hr.

Max. Marks – 40

Q 1. Separation of photosynthetic pigments/ water potential of potato tubers / Stomatal index / Estimation of protein in mulberry leaf. - 10 marks

Note: Distribution of marks

- a) Procedure - 4
- b) Labeled diagram / Result - 3
- c) To conduct Experiment - 3

Q 2. Estimation of haemolymph protein / glycogen/ glucose - 10 marks

Note: Distribution of marks

- a) Procedure - 4
- b) Result and conclusion - 3
- c) Conduct of experiment - 3

Q 3. Estimation of amylase/SDH/haemocytes/Hill reaction/chromatography - 10 marks

Note: Distribution of marks

- a) Procedure - 4
- b) Result and conclusion - 3
- c) Conduct of experiment - 3

Q 4. Identify and comment on the spots **A, B, C, D** and **E**. (Any five) - 10 marks

IV SEMESTER

COMPULSORY PRACTICAL / SKILL: SERSECP: GRAINAGE TECHNOLOGY

Credits-2

Practical

12 Practicals of 4 hr. each

1.	Silkworm seed organization, Basic seed multiplication centres - P4, P3, P2 and P1 stations; Seed areas- concepts, procedure and importance.	1 Prac.
2.	Concept of selected seed rearers/villages- Seed Legislation Act- maintenance of seed crops.	1 Prac.
3.	Seed cocoon markets- pupal examination, certification of seed cocoon lots- price fixation for seed cocoons.	1 Prac.
4.	Disinfection and hygiene in seed production units.	1 Prac.
5.	Seed production centres - types of grainages- organisation and functions of grainages	(Visit)
6.	Plan for model grainage- grainage equipments and their use - Seed production plan.	1 Prac.
7.	Procurement and transportation of seed cocoons- processing and preservation of seed cocoons- sex separation in seed cocoons.	1 Prac.
8.	Moth emergence and synchronization; sex separation; synchronization – safe duration.	1 Prac.
9.	Coupling and decoupling; oviposition; method of egg production; refrigeration of male moths; mother moth examinations- individual and mass methods - dry moth examination; environmental conditions for grainage activity.	1 Prac.
10.	Egg disinfection- handling of multivoltine eggs- preservation ideal embryonic stages for cold storage- maximum duration of cold storage. Handling of bivoltine eggs for early hatching- physical and chemical methods- hot and cold acid treatment.	1 Prac.
11.	Postponement of egg hatching; hibernation schedule for 3, 4, 6 and 10 months duration for bivoltine egg production. Preparation of disease free layings on sheet and loose eggs – advantages - handling of loose eggs.	1 Prac.
12.	Incubation of eggs-methods, environmental conditions required for incubation, postponement of egg hatching by temporary consignment.	1 Prac.
13.	Production of silkworm eggs in Government and LSPs.	(Visit)
14.	By products of grainages and their utilization.	1 Prac.

IV SEMESTER

ELECTIVE –2: SERE-200: SILK TECHNOLOGY

Credits-3

Theory

36 hr.

Unit-I		
1.	Physical and commercial characteristics of cocoons: cocoon colour, shape, size, hardness, grain/wrinkle, weight of cocoon, weight of cocoon shell, shell ratio, filament length, reelability percentage, raw silk recovery percentage, denier and renditta.	2 hrs.
2.	Purchase of cocoon in open auction in cocoon market; grading and sorting of multivoltine, bivoltine and cross breed cocoons.	2 hrs
3.	Cocoon stifling: Definition, objectives, different methods-conventional and modern techniques- steam stifling. Hot air drying- Batch type and conveyer type.	3 hrs
4.	Cocoon cooking/boiling: Definition and objectives, different methods of cocoon cooking – Mono pan, three pan and pressurized methods.	2 hrs
5.	Reeling water: quality required for silk reeling, hardness, pH; corrective measures.	2 hrs
6.	Cocoon brushing: Definition and objectives; methods of brushing.	1 hrs
Unit-II		
7.	Reeling: Objective; devices-country charaka, cottage basin, multi end reeling machine, auto and semi-automatic, improved CSTR reeling devices.	2 hrs
8.	Re-reeling and packing: Objectives, process; lacing, skeining, booking and baling.	2 hrs
9.	Raw silk properties- physical, chemical and biological. Other uses of raw silk.	2 hrs
10.	Raw silk testing and grading; Visual inspection. Mechanical tests; Supplementary tests- conditioning weight, scouring loss, exfoliation tests.	4 hrs
11.	Silk throwing: Introduction, objectives; soaking, winding, doubling, twisting, rewinding.	2 hrs
Unit-III		
12.	Silk weaving: Warp preparation, Weft preparation; pirn winding methods. Power loom and handloom weaving. Flow chart of weaving; weaving defects.	2 hrs.
13.	Chemical processing of silk yarns and fabric: Degumming- methods. Silk bleaching-methods and their importance	2 hrs.
14.	Silk dyeing-Acidic and basic dyeing processing; dyes and chemicals used for silk dyeing.	2 hrs.
15.	Printing: Hand block printing, Screen printing and Machine printing.	2 hrs.
16.	Spun silk industry- various steps involved, flow chart, spun silk yarn and noil yarn.	2 hrs.
17.	By-products of silk industry and their utilization.	2 hrs.

SERICULTURE IV SEMESTER
ELECTIVE –2: SERE-200: SILK TECHNOLOGY
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: Draw neat labeled diagrams wherever necessary

Section-A

I. Answer any TEN of the following

10x2=20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Section-B

II. Answer any SIX of the following

6X5=30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Section-C

III. Answer any THREE of the following

3X10=30

- 19.
- 20.
- 21.
- 22.

REFERENCE BOOKS

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