



**PROFORMA OF INSTRUCTION AND EXAMINATION
IN SERICULTURE AS AN OPTIONAL UNDER
CHOICE BASED CREDIT SEMESTER SYSTEM (CBCSS)
AND
CONTINUOUS ASSESSMENT GRADING
PATTERN(CAGP) IN B.Sc. COURSE**

Duration of the Course: 3 Years (6 Semesters)

Semester	Paper	Title of the Paper	Instruction Hrs/Week	Credit	Duration of Exam (Hrs.)	Marks		Total Marks
						I A (C1 C2)	Final Exam (C3)	
I	DSC-1A Theory	Sericultural Botany and Silkworm Biology	3	3	3	30	70	100
	DSC-1A Practical	Sericultural Botany and Silkworm Biology	3	1	3	30	70	100
II	DSC-1B Theory	Mulberry Cultivation and Silkworm Rearing	3	3	3	30	70	100
	DSC-1B Practical	Mulberry Cultivation and Silkworm Rearing	3	1	3	30	70	100
III	DSC-1C Theory	Mulberry and Silkworm Crop Protection	3	3	3	30	70	100
	DSC-1C Practical	Mulberry and Silkworm Crop Protection	3	1	3	30	70	100
IV	DSC-1D Theory	Physiology of Mulberry and Silkworm		3	3	30	70	100
	DSC-1D Practical	Physiology of Mulberry and Silkworm	3	1	3	30	70	100
Any Two Papers								
V	DSE-1A Theory	Cytogenetics and Breeding of Mulberry and Silkworm	3	3	3	30	70	100
	DSE-1A Practical	Cytogenetics and Breeding of Mulberry and Silkworm	3	1	3	30	70	100
	DSE-2A Theory	Silkworm Seed Technology	3	3	3	30	70	100
	DSE-2A Practical	Silkworm Seed Technology	3	1	3	30	70	100
	DSE-3A Theory	Seribiotechnology	3	3	3	30	70	100
	DSE-3A Practical	Seribiotechnology	3	3	3	30	70	100
Any Two Papers								
VI	DSE-1A Theory	Silk Technology	3	1	3	30	70	100
	DSE-1A Practical	Silk Technology	3	3	3	30	70	100
	DSE-2A Theory	Non Mulberry Sericulture, Sericulture Extension and Economics	3	1	3	30	70	100
	DSE-2A Practical	Non Mulberry Sericulture, Sericulture Extension and Economics	3	3	3	30	70	100
	DSE-3A Theory	Applied Entomology	3	3	3	30	70	100
	DSE-3A Practical	Applied Entomology	3	1	3	30	70	100

(DR. R. ANANTHA)



UNIVERSITY OF MYSORE
Yuvaraja's College (Autonomous)
SERICULTURE SYLLABUS AS AN OPTIONAL IN B.Sc. COURSE



I SEMESTER

DSC 1A- PAPER- 1: SERICULTURAL BOTANY AND SILKWORM BIOLOGY

3 hrs/week X 16 = 48 hrs.

Part -A: General Sericulture:

Unit-1

1. Introduction to Sericulture-Origin and history of Sericulture- Silk road, spread of Sericulture to Europe, South Korea, Japan, India and other countries. 2Hrs.
2. Sericulture map of India and World. Components of Sericulture. 2Hrs.
3. Sericultural practices in tropical and temperate climate. 2Hrs.
4. Employment generation in sericulture-Role of women in sericulture. 2Hrs.

Unit-2

5. Textile fibres: Types- natural and synthetic fibres- types of silk produced in India and their importance. 2Hrs.
6. Sericultural practices in rain-fed and irrigated conditions; traditional and non-traditional areas. 3Hrs.
7. Sericulture organization in India and Karnataka; role of state departments of Sericulture, Central Silk Board, Universities and NGOs in Sericulture development. 3Hrs.

Part-B: Sericultural Botany:

Unit-3

8. Salient features, economic importance of the family Moraceae. Phytogeography and systematics of the genus *Morus* L. and its species. Botanical description of mulberry. 4Hrs.
9. Morphology of mulberry: different cultivars of mulberry with special reference to Karnataka. Floral biology of mulberry: Structure of male and female flowers, Catkins. 4Hrs.

Unit-4

10. Anatomy of mulberry: internal structure of stem, root, petiole and leaf lamina; secondary growth in root and stem. Structure and organization of shoot and root meristems. 4Hrs.
11. Weeds of Mulberry garden, classification, characteristics, effect on crop plants. Weeding methods- Integrated weed management. 4Hrs.

Part -C: Silkworm Biology:

Unit-5

12. Characteristic features of the order Lepidoptera; detailed study of the families- Saturniidae and Bombycidae. Classification of sericigenous insects 2Hrs.
13. Classification of silkworms based on moultnism, voltinism and geographical distribution; popular silkworm breeds and hybrids of Karnataka; their economic traits. 3Hrs.
14. Life cycle of *Bombyx mori*; morphology of egg, larva, pupa and adult. 3Hrs.

Unit-6

15. Morphology and anatomy of digestive, circulatory, excretory, respiratory, nervous system of silkworm larva. 5Hrs.
16. Morphology and anatomy of reproductive systems of silk moth. 2Hrs.
17. Morphology and anatomical structure of Silk gland 1Hr.

DSC 1A- PRACTICAL-1: SERICULTURAL BOTANY AND SILKWORM BIOLOGY.

16 Practicals of 3 hrs each

General Sericulture:

1. Sericulture maps: (a) World maps and Silk Road.
(b) Sericulture map of India and Karnataka. 2Pract.
2. Preparation of histograms and pie charts on:
(a) Production of textile fibres in India.

(b) World silk production.

(c) Pie chart on mulberry and non-mulberry silk production in India.

1Pract.

Sericultural Botany:

3. Taxonomic description of mulberry.

1Pract.

4. Study of five popular mulberry cultivars of Karnataka (Mysore local, K₂, S₃₆, S₁₃ and V₁)

1Pract.

5. Mounting of Pollen grains, Ovule and Embryo.

1Pract.

6. Anatomy of petiole, leaf lamina, stem and root.

2Pract.

7. Weeds of mulberry garden.

1Pract.

Silkworm Biology:

8. Life cycle of *Bombyx mori*- Morphology of egg, larva, pupa and adult of *Bombyx mori*.

1Pract.

9. Sex separation in larva, pupa and adult of the silkworm *Bombyx mori*.

1Pract.

10. Dissection and display of:

(a) Digestive system of larva.

(b) Silk glands.

(c) Reproductive system of male and female moths.

(d) Mounting of larval mouth parts and spiracle.

(e) Nervous system of silkworm larva.

5Pract.

II SEMESTER

DSC 1B- PAPER-2: MULBERRY CULTIVATION AND SILKWORM REARING

3 hrs/week X 16 = 48 hrs.

Part –A: Mulberry Cultivation:

Unit- 1

1. Definition of soil, soil structures, soil textures and soil profile.

2 Hrs.

2. Different types of soils in India, soil conservation methods.

2 Hrs.

3. Importance of soils with reference to mulberry cultivation; soil analysis- soil sampling, soil pH, organic carbon and NPK level.

2Hrs.

4. Propagation of mulberry- seedling, sapling, grafting and layering.

2Hrs.

Unit –2

5. Establishment of mulberry garden: Areas under mulberry cultivation in India, Species and Varieties under cultivation in India, General Descriptions, Climatic requirements, Soil conditions, mulberry cultivation under rain-fed and irrigated conditions, mulberry cultivation in hilly areas, mixed forming. Special references to tree plantations.

4Hrs.

6. Raising of commercial nursery; Application of root inducing hormones.

1Hr.

7. Introduction to different types of Manures and fertilizers: Biofertilizers, Foliar nutrition, Plant nutrients (macro and micro nutrients), composting, vermicomposting and Plant Hormones.

3Hrs.

Unit-3

8. Intercultivation and Mulching practices: Purpose, methods, time and frequency.

2Hrs.

9. Irrigation: Importance, Source, methods, periodicity and quantity of irrigation, over-irrigation and its effects.

2Hrs.

10. Leaf harvesting: harvesting methods (leaf and shoot harvests); transportation and preservation of harvested leaf and shoots. Pruning- Objectives, Importance and methods .

2Hrs.

11. Estimation of leaf yield: Importance of leaf quality.

2Hrs.

Part-B: Silkworm Rearing:

Unit -4

12. Rearing house: Location, orientation, plan and utilities; model rearing house; low-cost rearing house.

3Hrs.

13. Rearing appliances-shelf and shoot rearing; requirements of rearing appliances (per unit rearing of 100 dfls).

2Hrs.

14. Disinfection of rearing house and rearing appliances; disinfectants (formalin, bleaching powder, chlorine dioxide, slaked lime and iodine compounds); rearing and personal hygiene.

3Hrs.

Unit-5

15. Selection of silkworm races/breeds for rearing- advantages and disadvantages of bivoltine and multivoltine pure races/ breeds and hybrids.

2Hrs.

16. Incubation- definition, requirement of environmental conditions, incubation devices; identification of

- different stages of development; black boxing and its importance. 2Hrs.
17. Chawki rearing: Preparation; brushing and its methods; types of chawki rearing – traditional and improved method; optimum environmental conditions; methods and frequency of feeding; methods of bed cleaning; spacing; moulting and care during moult. 4Hrs.

Unit -6

18. Late age silkworm rearing: Methods; optimum environmental conditions; feeding quantity and frequency; methods of bed cleaning; spacing; moulting and care during moult. 3Hrs.
19. Identification of spinning larva; spinning; mounting and mounting density; types of mountages, their advantages and disadvantages; environmental requirements during spinning. 2Hrs.
20. Harvesting: Time of harvesting; sorting, storage/ preservation, packaging and transport of cocoons; leaf-cocoon ratio; maintenance of rearing records. 3Hrs.

DSC 1B- PRACTICAL –2: MULBERRY CULTIVATION AND SILKWORM REARING

16 Practicals of 3 hrs each

Mulberry Cultivation:

1. Determination of soil pH and water holding capacity. 2Pract.
 2. Farm implements. 1Pract.
 3. Preparation of land, pits and rows; preparation of rooting media (fieldwork). 1Pract.
 4. Raising of sapling and seedling (field work). 1Pract.
 5. Intercultivation, mulching, irrigation, pruning and estimation of leaf yield. (Demonstration and exercise). 1Pract.
 6. Grafting and Layering in mulberry. 1Pract.
 7. Harvesting and preservation techniques; leaf selection for different instars. 1Pract
- Silkworm Rearing:
8. Rearing houses- model rearing house and low-cost rearing house. 1Pract.
 9. Rearing appliances. 1Pract.
 10. Disinfection- Types of disinfectants- concentration and dosage requirement; preparation of spray formulation of disinfectants. 2Pract.
 11. Incubation of silkworm eggs- Methods; black boxing; maintenance of temperature and humidity; 1Pract.
 12. Brushing: Methods; chawki rearing; use of paraffin paper and blue polythene sheet. Bed cleaning; use of bed cleaning net and disposal of bed refuses and silkworm litter. 1Pract.
 13. Moulting: Identification of moulting larva, care during moulting; mounting and mounting density; harvesting of cocoons; assessment of cocoons; types of mountages; Maintenance of records for silkworm rearing. 2Pract.

III SEMESTER

DSC 1C-PAPER- III: MULBERRY AND SILKWORM CROP PROTECTION

3 hrs/week X 16 = 48 hrs.

Part-A: Diseases and Pests of Mulberry:

Unit-1

1. Introduction to plant diseases and importance of plant protection. 1Hr.
2. Classification of mulberry diseases. 1Hr.
3. Influence of biotic and abiotic factors on the incidence of plant diseases 1Hr.
4. Mineral deficiency symptoms in mulberry. 2Hrs.
5. Pesticides: Forms, formulations, calculation and application. 3Hrs.

Unit-2

6. Fungal diseases of mulberry: Occurrence, symptoms, etiology and preventive and control measures of the following diseases : (a) Powdery mildew.(b) Leaf spot.(c) Leaf rust.(d) Leaf blight.(e) Root rot. 5Hrs.
7. Root-knot disease of mulberry- occurrence, symptoms and preventive and control measures. 1Hr.
8. Viral, bacterial and dwarf diseases of mulberry- their occurrence- symptoms and preventive and control measures. 2Hrs.

Unit-3

9. Pest: Definition; pest outbreak; pest forecasting . 1Hr.
10. Major pests: leaf roller, Bihar hairy caterpillar, mealy bug and thrips – their preventive and control measures 4Hrs.
11. Minor pests: girdlers, termites and mites-their preventive and control measures. 3Hrs.

Part -B: Diseases and Pests of Silkworm:

Unit-4

14. Introduction; classification of silkworm diseases. 1Hr.
15. Protozoan disease – symptomatology, structure of pebrine spore, life cycle of *Nosema bombycis*, source, mode of infection and transmission, cross infectivity, prevention and control. 4Hrs.
16. Bacterial diseases - causative agents, symptoms, factors influencing flacherie, source, mode of infection and transmission, prevention and control. 3Hrs.

Unit-5

17. Viral diseases (grasserie, infectious flacherie, cytoplasmic polyhedrosis, denonucleosis and gattine) - causative agents- symptoms – sources, mode of infection and transmission- prevention and control. 4Hrs.
18. 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. 3Hrs.
19. Integrated management of silkworm diseases. 1Hrs.

Unit-6

20. 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. 2Hrs.
21. Cocoon pests of silkworm: Dermestid beetle- life cycle; nature and extent of damage; prevention and control measures. 1Hr.
22. Predators of silkworm: Cockroaches, ants, lizards and rodents; prevention and control measures. 2Hrs.
23. Brief account of methods of pest control: Cultural, mechanical, physical, legislative (Quarantine), chemical, genetical / autocidal, biological and IPM. 3Hrs.

DSC 1C - PRACTICAL –3: MULBERRY AND SILKWORM CROP PROTECTION

16 Practicals of 3 hrs each

Diseases and Pests of Mulberry:

1. Study of powdery mildew, leaf spot and leaf rust through sectioning, staining and temporary mounting. 3Pract.
2. Study of root-knot nematode in mulberry . 1Pract.
3. Collection, mounting/preservation of insect pests of mulberry (field work). 1Pract.
4. Identification of mulberry pests. Study of nature of damage of the following pests: Leaf roller, Bihar hairy caterpillar, scale insect, mealy bug, thrips, beetles, jassids and grasshoppers. 2Pract.
5. Study of pesticides, their formulation, applicators (sprayers and dusters). 1Pract.
- Diseases and Pests of Silkworm:**
6. Identification of different diseased silkworms based on external symptoms (grasserie, flacherie, muscardine and pebrine). Identification of pathogens associated with silkworm diseases: Staining and preparation of temporary slides of bacteria, spores of pebrine, polyhedra of nuclear polyhedrosis virus and mycelial mat/spores of muscardine. 4Pract.
7. Methods of application of silkworm bed disinfectants for management of silkworm diseases. 1Pract.
8. Life cycle of Uzi fly; Identification of uzi-infested silkworms and cocoons. 1Pract
9. Life cycle of dermestid beetles: Dermestid beetle infested silkworm cocoons and estimation of incidence. 1Pract.
10. Predators of silkworm. 1Pract.

IV SEMESTER

DSC 1D- PAPER –4: PHYSIOLOGY OF MULBERRY AND SILKWORM

3 hrs/week X 16 = 48 hrs.

Part –A: Physiology of Mulberry:

Unit –1

1. Absorption of water and solutes by roots; effect of external conditions; root pressure; ion exchange and active absorption. 5Hrs.

2. Mineral nutrition- macro and micro nutrients; their physiological role.	3Hrs.
Unit -2	
3. Transpiration: Significance; stomata- mechanism of opening and closing; regulation of water loss by stomata; factors influencing the rate of transpiration.	2Hrs.
4. Brief account of biological nitrogen fixation; types- importance in mulberry cultivation.	2Hrs.
5. Biofertilizers, types and its significance.	2Hrs.
6. Biochemical composition of mulberry leaf	2Hrs.
Unit-3	
7. Brief account of photosynthesis: Outline of the process; types of carbon fixation (C3 and C4); brief account of photorespiration and its significance.	4Hrs.
8. Plant growth regulators: Importance and application in mulberry, agriculture and horticulture.	2Hrs.
9. Role of environmental factors on mulberry growth.	2Hrs.
Part-B: Developmental Biology and Physiology of Silkworm:	
Unit-4	
10. Digestion: Artificial diets, feeding apparatus, feeding behaviour –phagostimulants - feeding deterrents - nutritive requirements of the silkworm, midgut structure and function - midgut pH- potassium secretion. structure and function of digestive system; digestive enzyme; process of digestion.	4Hrs.
11. Respiration: tracheal systems- spiracles, mechanism of respiration, factors affecting respiration.	2Hrs.
12. Excretion: structure and function of excretory system and cryptonephrial arrangement and its significance in water regulation.	2Hrs.
Unit-5	
13. Neuro -endocrine system: Nervous system; Structure and distribution of endocrine glands; role of nervous system in endocrine function.	4Hrs.
14. Sense organs: Photoreceptors, Chemoreceptors and Mechanoreceptors.	2Hrs.
15. Circulation: heart beat-role of alary muscles; accessory hearts; blood pressure in open circulatory system. Haemolymph.	2Hrs.
Unit-6	
16. Reproduction: Male and female reproductive systems in insects; role of accessory gland; oviposition.	2Hrs.
17. Muscle Physiology: Histology of insect muscles, flight muscles in insects, ultra structure of skeletal muscle, mechanism of muscle contraction.	2Hrs.
18. Integument: Structure, formation and function.	2Hrs.
19. Metamorphosis- types of insect metamorphosis, theories of metamorphosis.	2Hrs.

DSC 1D-PRACTICAL –4: PHYSIOLOGY OF MULBERRY AND SILKWORM

16 Practicals of 3 hrs each

Physiology of Mulberry:

1. Determination of stomatal index	1Pract.
2. Kranz Anatomy in relation to photosynthesis.	1Pract.
3. Estimation of leaf protein	1Pract.
4. Separation of leaf photosynthetic pigments of mulberry through paper chromatography.	1Pract.
5. Extraction of photosynthetic pigments by solvent wash method.	1Pract.
6. Determination of water potential of potato tubers.	1Pract.
7. Estimation of moisture percentage and moisture retention capacity of mulberry leaf.	1Pract.
8. Hill reaction.	1Pract.

Developmental Biology and Physiology of Silkworm:

9. Estimation of proteins in haemolymph/egg.	1Pract.
10. Estimation of haemolymph glucose level.	1Pract.
11. Morphology of haemocytes in silkworm.	1Pract.
12. Estimation of amylase activity in haemolymph of bivoltine and multivoltine races.	1Pract.
13. Estimation of SDH activity in the eggs/tissue.	1Pract.
14. Estimation of glycogen in fatbody/ovary of silkworm.	2Pract.
15. Estimation of uric acid in silkworm litter.	1Pract.

V SEMESTER

PAPER DSE 1A: CYTOGENETICS AND BREEDING OF MULBERRY AND SILKWORM

3 hrs/week X 16 = 48 hrs.

Part-A: Cytogenetics and Breeding of Mulberry:

Unit-1

1. Ultra-structure of eukaryotic cell. 2Hrs.
2. Ultra-structure of chromosomes; Special types of chromosomes- lampbrush and salivary gland chromosomes. 3Hrs.
3. Cell division; Mitosis and Meiosis. 3Hrs.

Unit-2

4. Brief account of polyploidy in plants- polyploidy in mulberry. 1Hr.
5. Chromosomal aberration- Deletion, duplication, inversion and translocation. 2Hrs.
6. Mutation- Types; mutagens; physical and chemical mutagenesis. Mulberry mutants. 3Hrs.
7. Germplasm bank: Importance; collection, characterization and maintenance. 2Hrs.

Unit-3

8. Anther and ovule in mulberry; micro- and megasporogenesis; development of male and female gametophytes; pollination, fertilization; development of endosperm, embryo and seed; polyembryony and parthenocarpy in mulberry. 4 Hrs.
9. Plant introduction and acclimatization; Quarantine. 2 Hrs.
10. Mulberry breeding: Objectives; selection methods. 2 Hrs

Unit -4

11. Hybridization technique and selection. 2 Hrs
12. Polyploidy breeding and Mutation breeding. 2 Hrs
13. Breeding for disease and Drought resistance. 2 Hrs.
14. Evaluation of selected genotypes and release of improved varieties. 2 Hrs.

Part-B: Genetics and Breeding of Silkworm:

Unit-5

15. Silkworm germplasm bank. 1Hr.
16. Structure and chromosome numbers in mulberry and non-mulberry silkworms- evolutionary significance of chromosomes in *Bombyx mori*. Linkage groups in *Bombyx mori*. 2 Hrs.
17. Sex determination mechanism in silkworm- importance of ZZ and ZW chromosomes- sex-limited races. Parthenogenesis in silkworm. 2 Hrs.
18. Gametogenesis- Oogenesis and Spermatogenesis 2 Hrs.
19. Genetic basis of voltinism and moultinism in the silkworm, *Bombyx mori*. 1 Hr.

Unit-6

20. Introduction to silkworm breeding- inbreeding and out breeding concepts- objectives of silkworm breeding. Different types of breeding methods- line breeding, cross breeding and mutation breeding. 2. Hrs.
21. Hereditary traits of silkworm egg, larva, pupa and adult. 2 Hrs.
22. Genetics of cocoon colours- inheritance of cocoon colours. 1Hr.
23. Selection Methods of selection. fixation of characters- evolution of new breeds- race authorization. 1Hr.
24. Heterosis/hybrid vigour-exploitation of heterosis in silkworm- concept of single, double and polyhybrids. 2 Hrs.

PRACTICAL DSE 1A: CYTOGENETICS AND BREEDING OF MULBERRY AND SILKWORM

16 Practicals of 2 hrs each

Mulberry Breeding:

1. Mulberry germplasm and Mulberry multilocational trials (field visit) 1Pract.
2. Evaluation of breeding parameters in different mulberry varieties. 2Pract.
3. Induction of tetraploidy in mulberry by using colchicin (Demonstration) 1Pract.
4. Study of mitosis in onion root tip/mulberry root tip. 2Pract.
5. Mulberry breeding equipments. 1Pract.
6. Hybridization technique in mulberry. 1Pract.

Silkworm Breeding:

7. Study of meiosis in grasshopper and silkworm testis. 2Pract.

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| 8. Identification of different races of silkworm cocoons- NB ₄ D ₂ , KA, PM, C.Nichi, Nistari, CSR ₂ and CSR ₄ race/ breeds characters. | 1Pract. |
| 9. Identification of mutants of silkworm larva- zebra, ursa, knobbed and sex-limited Races. | 1Pract. |
| 10. Comparative assessment of the hybrids and pure race cocoons. | 2Pract. |
| 11. Estimation of heterosis. | 1Pract. |
| 12. Estimation of inbreeding depression. | 1Pract. |

PAPER DSE 2A: SILKWORM SEED TECHNOLOGY

3 hrs/week X 16 = 48 hrs.

Unit-1

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| 1. Developmental biology: Morphology and structure of silkworm egg, fertilization, cleavage, blastoderm, germ band formation, blastokinesis, eye spot and blue egg; diapause development. | 6Hrs. |
| 2. A general account of silkworm seed, grainages, production and demand trends. | 2Hrs. |

Unit-2

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| 3. Silkworm seed organisation, significance of seed organization; Basic seed multiplication centres-P ₄ , P ₃ , P ₂ and P ₁ ; Seed areas- identification; concept. | 4Hrs. |
| 4. Concept of selected seed rearers/villages- Seed Legislation Act- maintenance of seed crops. | 4Hrs. |

Unit-3

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| 5. Seed cocoon markets- pupal examination, certification of seed cocoon lots- price fixation for seed cocoons. | 4Hrs. |
| 6. Disinfection and hygiene in seed production units. | 2Hrs. |
| 7. Seed production centres (grainages)- types of grainages- organisation and functions of grainages. | 2Hrs. |

Unit-4

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| 8. Plan for model grainage- grainage equipments and their use - Seed production plan. | 3Hrs. |
| 9. Procurement and transportation of seed cocoons- processing and preservation of seed cocoons- sex separation in seed cocoons. | 2Hrs. |
| 10. Moth emergence and synchronisation; sex separation in moth; effect of improper synchronisation on egg hatching and quality-safe duration. | 3Hrs. |

Unit-5

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| 11. 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. | 4Hrs. |
| 12. Egg disinfection- handling of multivoltine eggs- preservation of eggs to postpone hatching- 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. | 4Hrs. |

Unit-6

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| 13. Postponement of hatching; hibernation schedule for 3, 4, 6 and 10 month's duration. | 4Hrs. |
| 14. Preparation of layings and loose egg- advantages- handling of loose eggs; Incubation of eggs. | 2Hrs. |
| 15. Incubation of eggs-methods, environmental conditions required for incubation, postponement of hatching of eggs by temporary consignment. | 1Hr. |
| 16. Grainage management-Role of LSPs. Bye products of grainage and their utilization. | 1Hr. |

PRACTICAL DSE 2A: SILKWORM SEED TECHNOLOGY

16 Practicals of 2 hrs each

Part-A: Silkworm Seed Production:

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| 1. Morphology of silkworm egg and mounting of 5 th , 6 th , 7 th , 8 th and 9 th day old embryos. | 2Pract. |
| 2. Model grainage plan and Grainage equipments. | 2Pract. |
| 3. Seed cocoon processing/handling- deflossing, sorting and preservation- pupal examination and Sex separation of pupa and moth. Synchronization of emergence. | 2Pract |
| 4. Moth emergence- selection of moths- pairing and de-pairing- oviposition- preservation of male moths- preparation of disease free layings- sheet egg and loose egg preparation-Preparation of starch coated paper, washing of loose eggs, Drying-Treatment of eggs with acid-Weighing and packing. | 4Pract. |

5. Pupa and Mother moth examination for Pebrine spores- Individual and Mass moth examination- surface disinfection of silkworm eggs. Preservation and handling of hibernated eggs for 3, 4, 6 and 10 month hibernation schedules. 3Pract.
6. Acid treatment of bivoltine eggs- hot acid and cold acid treatment. Incubation of acid treated eggs- Calculation of hatching percentage. 2Pract.
7. Visit to Seed cocoon markets, commercial Grainage and cold storage center to know activities of cocoon markets, preparation of layings and cold storage of eggs. 3Pract.

PAPER DSE 3A: SERIBIOTECHNOLOGY

3 hrs/week X 16 = 48 hrs.

Unit 1

1. Introduction: Scope and importance of plant biotechnology. 1Hr.
2. Plant cell and tissue culture techniques: Introduction and historical background of plant Morphogenesis and tissue culture, laboratory requirements for plant tissue culture, culture media; applications of cell and tissue culture in mulberry. 3Hrs.
3. Growth in relation to morphogenesis: Cell and organ differentiation; de-differentiation and re-differentiation; cell competence; concept of totipotency; regeneration. 2Hrs.
4. Micropropagation; somatic embryogenesis, multiple shoot formation, somaclonal variations, synthetic seeds in mulberry. 2Hrs.

Unit 2

5. Production and uses of haploids: Anther culture, pollen culture, ovule culture, bulbasum technique; detection of haploids; applications of haploids in mulberry breeding. 2Hrs.
6. Somatic hybridization: Isolation of protoplast; viability and plating density of protoplasts; Protoplast culture; isolation of sub-protoplast; regeneration of plants; protoplast fusion and uses of somatic hybrids; genetic modification of protoplast. 2Hrs.
7. Preservation and screening of germplasm for drought, salinity and disease resistance in mulberry. Embryo and endosperm culture; bioreactors. 2Hrs.
8. Recombinant DNA technology: Cloning vectors for recombinant DNA, cloning and expression of vectors. 2Hrs.

Unit 3

9. Gene transfer methods in plants; target cells for transformation; gene transfer techniques using *Agrobacterium*; selectable and scorable markers; agro infection and gene transfer in mulberry. 2Hrs.
10. Transgenic plants and their role in crop improvement; molecular farming and regulated gene expression. 2Hrs.
11. Transformation of chloroplast genome (Cg) in higher plants using *Agrobacterium* and particle gun; targeting of foreign protein into chloroplast and mitochondria. 2Hrs.
12. Patenting transgenic organisms and isolated genes and DNA sequences; Plant breeder's rights (PBRs) and farmers' rights. 2Hrs.

Unit 4

13. Animal cell and tissue culture: History, scope, advantages and disadvantages. Insect cell and tissue culture and their applications; media preparation and culturing procedures; somatic cell fusion. 4Hrs.
14. Silkworm cell culture – establishment of primary and secondary cell lines, composition and preparation of media and maintenance of cultures. 2Hrs.
15. Tissue and organ culture; whole embryo culture; tissue grafting. 2Hrs.

Unit 5

16. Polymerase chain reaction (PCR): Gene amplification, application of PCR in silkworm biotechnology. 2Hrs.
17. Principles and fundamentals of biotechnology; Application of biotechnology in silkworm – new textile fibres, improvement of silkworm strains and marker assisted breeding. 2Hrs.
18. A brief account of transgenic animals: Insect transgenesis – silkworm transgenesis, application of silkworm transgenesis, piggy bac transposon, red fluorescent protein expression in *Bombyx mori*. 3Hrs.

Unit 6

19. Genetic resistance of the silkworm, *Bombyx mori*, to bacterial and viral diseases. Immune response against bacterial and viral diseases in silkworm; regulation of host gene expression, inducible anti-bacterial and anti-viral proteins in silkworm. Molecular triggering of anti bacterial proteins – antibacterial protein gene expression. 3Hrs.
20. *BmNPV* vector – life cycle – genomic organization of *BmNPV*, biotechnological application for large - scale synthesis of recombinant proteins (valuable proteins) using *BmNPV* in different stages of *Bombyx mori*. 3Hrs.
21. Preservation of endangered non-mulberry silkworms through biotechnological approaches. 1Hr.
22. IPR, patenting, WTO-GATT and bioethics. 2Hrs.

PAPER DSE 3A: SERIBIOTECHNOLOGY

16 Practicals of 3 hrs each

1. Separation and identification of amino acids by chromatography. 1pract.
2. Procedure for sterilization and preparation of culture media. 1pract.
3. Study of callus, embryogenesis and organogenesis in mulberry – *in vitro*. 3pract.
4. Studies on isozyme polymorphism through PAGE in mulberry 1pract.
5. Studies on protein polymorphism through PAGE in mulberry leaf. 1pract.
6. Preparation of synthetic seeds in mulberry. 1pract.
7. Media preparation for silkworm cell lines. 1pract.
8. Selection of tissue for establishment of silkworm cell lines. 1pract.
9. Protein profile in haemolymph and fat body tissues in silkworm through PAGE. 1pract.
10. Polyacrylamide gel electrophoresis – esterases in silkworm. 1pract.
11. Polyacrylamide gel electrophoresis – phosphatases and dehydrogenases in silkworm. 1pract.
12. Estimation of protease enzyme in the mid gut tissue of silkworm through calorimetric method. 1pract.
13. Demonstration of Northern blotting techniques. 1pract.
14. Calorimetric estimation of RNA in silk gland of silkworm. 1pract.

VI SEMESTER

PAPER DSE 1C: SILK TECHNOLOGY

3 hrs/week X 16 = 48 hrs.

Unit-1

1. Introduction to different textile fibres. 2Hrs.
2. Physical and commercial characteristics of cocoons: cocoon colour, shape, size, hardness, grain/wrinkle, weight of cocoon, weight of cocoon shell, shell ratio. 2Hrs.
3. Cocoon marketing- Procedure for procurement of raw material- purchase of cocoon in open auction; grading of cocoons- visual inspection and selection. 2Hrs.
4. Cocoon sorting: Objectives and procedure; defective cocoons- double, flimsy, melted, urinated, stained, uzi-infested, moth emerged, deformed and flossy. 2Hrs.

Unit-2

5. Cocoon stifling: Definition, objectives, different methods-conventional and modern techniques- steam stifling. Hot air drying- Batch type and conveyer type; advantages and disadvantages. 3Hrs.
6. Conditioning and preservation- Methods of storing and preservation of stifled cocoons. 1Hr.
7. Cocoon cooking/boiling: Definition and objectives, different methods of cocoon boiling- Mono pan, three pan and pressurized cocoon boiling methods. 2Hrs.
8. Cocoon brushing: Definition and objectives; methods- stick, hand and mechanical brushing. 2Hrs.

Unit-3

9. Reeling water: quality required for silk reeling, total and permanent hardness, optimal pH; corrective measures. 3Hrs.
10. Reeling: Objective and cocoon reeling from various devices-country charaka, cottage basin, multi end reeling machine, auto and semi-automatic, improved CSTR reeling devices; advantages and disadvantages. 3Hrs.
- 11 Re-reeling and packing: Objectives, process; lacing, skeining, booking and baling. 2Hrs.

Unit-4

12. Raw silk properties- physical, chemical and biological. Uses of raw silk- Textile and other commercial uses. 2Hrs.
13. Raw silk testing and grading; Visual inspection. Mechanical tests- winding test, size deviation test, seriplane test, serigraph test and cohesion test. Supplementary tests- conditioning weight, scouring loss, exfoliation tests. 4Hrs.
14. Silk throwing: Introduction, objectives of silk throwing, preparation for twisting, soaking, winding, doubling, twisting (high & low), heat/steam setting, rewinding. 2Hrs.

Unit-5

15. Silk weaving: Warp preparation- warp, beaming, drawing and denting. Weft preparation- different pirn winding methods. Powerloom and handloom weaving. Flow chart of weaving; weaving defects. 3Hrs.
16. Chemical processing of silk yarns and fabric: Introduction and objectives of degumming- Methods. Silk bleaching- Importance and processing. Silk dyeing- Acidic and basic dyeing processing. Introduction of different classes of dyes and chemicals used for silk dyeing. 3Hrs.
17. Detailed study of spun silk industry- various steps involved, flow chart, spun silk yarn and noil yarn. 2Hrs.

Unit-6

18. Printing of silk fabrics: Objectives, methods- hand and screen-printing. 2Hrs.
19. Silk finishing: Objectives, methods- Mechanical and chemical finishing. 2Hrs.
20. Introduction to by-products of sericulture industry, by- product utilization in mulberry; types of silk waste and pupal waste-oil extraction and cake preparation. 4Hrs.

PRACTICAL DSE 1C–VII: SILK TECHNOLOGY

16 Practicals of 3 hrs each

1. Categorization of different types of cocoons- good and defective cocoons- calculation of percentage of each type . 1Pract.
2. Cocoon stifling- different methods and determination of degree of drying. 1Pract.
3. Reeling water: Determination of total and permanent hardness, alkalinity and pH. 1Pract.
4. Cocoon cooking- different methods. 1Pract.
5. Determination of commercial characters of cocoon-average cocoon weight, shell weight, shell percentage or shell ratio, average filament length, reelability, raw silk recovery percentage, renditta and denier; reeling on epprouvette. 2Pract.
6. Identification of silk, cotton, wool and synthetic fibre (viscose/nylon/polyester) by physical method- flame and microscopic test, chemical and confirmatory tests. 2Pract.
7. Study of charaka, cottage basin, multi-end silk reeling machine, automatic and semi- automatic reeling machine-practical demonstration. (Visit to private reeling unit and filature). 1Pract.
8. Degumming of raw silk by soap & soda wash method and estimation of sericin and fibroin percentage. 1Pract.
9. Study of silk fabric manufacturing unit- Power & handloom. Identification of weaving defects (Visit only) 1Pract.
10. Bleaching of silk fibres. 1Pract.
11. Silk dyeing to obtain different shades using acid dye stuff. 2Pract.
12. Identification of different types of silk waste; floss, cooker, reeler, basin refuse and re-reeling waste, dupion silk. 1Pract.
13. Pupal oil extraction. 1Pract.

PAPER DSE 2C: NON-MULBERRY SERICULTURE, SERICULTURE EXTENSION AND ECONOMICS.

3 hrs/week X 16 = 48 hrs.

Part -A: Non -Mulberry Sericulture:

Unit-1

1. Types of non-mulberry silkworms and their distribution in India and other countries. 1Hr.
2. Taxonomy of food plants of non-mulberry silkworms: Study of salient features of the families, Magnoliaceae, Caesalpiniaceae, Euphorbiaceae, Combretaceae, Apocyanaceae,

- giving more emphasis on the plants of Sericultural importance. 4Hrs.
3. Cultivation of primary food plants of tasar, muga, and eri silkworms- *Terminalia arjuna*, *Machilus bombycina*, *Ricinus communis* and their systematic position. 3Hrs.

Unit-2

4. Life cycle of Tasar, Eri and muga silkworms. 2Hrs.
5. Brief account of important diseases and pests of primary non-mulberry food plants and their management. 2Hrs.
6. Rearing of non-mulberry silkworms. Ecological conditions that influence rearing of non-mulberry silkworms- improved rearing methods for young and late age tasar, eri and muga silkworms. Mounting methods- different kinds of mountages- rearing of seed and commercial crops- Indoor rearing of tropical tasar and muga silkworms. 4Hrs.

Unit-3

7. Seed cocoons- Procurement- cocoon preservation-synchronization of moth emergence- production of disease free eggs. 3Hrs.
8. Diseases of non-mulberry silkworms- protozoan, bacterial, viral and fungal diseases. Symptoms- causative agents-preventive and control measures. 5Hrs.

Part-B: Sericulture Extension and Economics:

Unit-4

9. Extension education- meaning ,objectives and importance. 1Hr.
10. Principles and concepts of extension education 2Hrs
11. Extension programmes- concepts and principles, role of extension personnel and farmers in programme planning Transfer of technology. 3Hrs.
12. Communication- definition and planning- types of communication. 2Hrs.

Unit-5

13. Training- concepts and definition- different methods of training. 2Hrs.
14. TSC's and Co-Operative chawki rearing centers: Role and Importance. 2Hrs.
15. Farm management. 2Hrs.
16. Mulberry cultivation (per hectare) –Cost and returns under irrigation and rain fed condition. 2Hrs.

Unit-6

17. Economics of egg production: Expenditure and income. 2Hrs.
18. Economics of silkworm rearing: Investment and returns. 2Hrs.
19. Economics of silk reeling (per kg of raw silk): Cost and returns for different types of reeling establishments. 2Hrs.
20. Silk exchange, KSMB and KSIC. 2Hrs.

PRACTICAL - VIII: NON-MULBERRY SERICULTURE, SERICULTURE EXTENSION AND ECONOMICS

16 Practicals of 3 hrs each

Non -Mulberry Sericulture:

1. Rearing appliances used in rearing and seed preparation of non mulberry silkworms (Drawing / sketches). 3Pract.
2. Taxonomic features of non-mulberry food plants (*Terminalia arjuna*, *Terminalia catapa*, *Ricinus communis*, *Michelia champaca*, *Quercus* sp., *Bauhinia vareigata* and *Manihot utilissima*) 4Pract.
3. Life cycle and morphology of egg, larva, pupa, cocoon and moths of different non-mulberry silkworms. 3Pract.

Extension:

4. Preparation of audio visual aids- Charts, hand outs, pamphlets- film shows – arranging and conducting of panel discussion with the rearers. 1Pract.
5. Visit to rearers' house and panel discussion with farmers. 1Pract.
6. Visit to TSC and CRC. 1Pract.
7. Presentation of statistical data- Bar chart and graph, pie chart of raw silk, cocoon, area under mulberry cultivation, import And exports. 1Pract.
8. Field/Institute Visit. 2Pract.

A minor project on economics of sericulture industry (any one).

PAPER DSE 3C: APPLIED ENTOMOLOGY

3 hrs/week X 16 = 48 hrs.

Unit-1

1. General characteristic features of insects – salient features of insect orders with special reference to Lepidoptera, Diptera, Hymenoptera, Coleoptera, Homoptera and Neuroptera. 4Hrs.
2. Metamorphosis in insects – Types. 2Hrs.
3. Insect age, abundance and adaptations; insects as the most successful organisms on earth. 2Hrs.

Unit -2

4. 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. 4Hrs.
5. Harmful insects: Agricultural pests -cereals, pulses, vegetables, oilseeds and stored grains. 4Hrs.

Unit -3

6. Veterinary insects and other pests -blood sucking flies, lice, fleas and arachnids. 4Hrs.
7. Pests of public health importance - mosquito, house fly, louse, bed bug and rat flea. 4Hrs.

Unit -4

8. Collection and preservation of insects - collection methods - baits, killing, preservation, mounting, labeling and identification of a few insects using keys. 4Hrs.
9. Insect pests and their control: Definition and origin of pests; Categories and types of pests. Symptoms and injuries caused by pests. 4Hrs.

Unit-5

10. Insect vectors; Economic threshold and economic injury level; Pest control: General considerations – different methods – IPM. 8Hrs.

Unit-6

11. Insects as human food: Commonly eaten insects, nutritional value and advantages of eating insects. 2Hrs.
12. Insects as important laboratory tools for scientific research - silkworm, fruit fly, house fly and mosquito. 2Hrs.
13. Social insects - termites, honeybees, wasps and ants. 2Hrs.
14. Mass production of biocontrol agents:
 - (a) Insectary – Models and facilities
 - (b) Mass production of parasitoids (egg, larval and pupal)
 - (c) Mass production of predators
 - (d) Mass production of pathogens
 - (e) Storage, packaging, transportation and release of biocontrol agents. 6Hrs.

PRACTICAL DSE 3C: APPLIED ENTOMOLOGY

16 Practicals of 3 hrs each

1. Collection and identification of insects belonging to orders: Lepidoptera, Coleoptera, Orthoptera, Diptera, Hymenoptera and Homoptera. 2pract.
 2. Collection and methods of insect preservation. 1pract.
 3. Studies on beneficial insects-silkworm, honeybee and lac insect. 2pract.
 4. Studies on life cycle of harmful insects: Bihary hairy caterpillar, cutworm, leaf roller chaffer beetle, termites, Scale insect, leaf hoppers, thrips and jassid. 2pract.
 5. Studies on life cycle of silkworm pests: Uzi fly and dermestid beetle. 1pract.
 6. Study of insects for scientific research - silkworm, fruit fly, house fly and mosquito. 2pract.
 7. Study of social insects - termites, honeybees, wasps and ants. 1pract.
 8. Planning the facilities required for establishment of insectary. 1pract.
 9. Observations on insect pathogens and symptoms. 2pract.
 10. Observations on insect parasitoids and predators. 2pract.
-

SCHEME OF THEORY EXAMINATION

Sl.No.	Semester	Paper	Marks for Internal Assessment as C1 and C2	Marks for theory Final Examination as C3	Total
1	I	I	30	70	100
2	II	II	30	70	100
3	III	III	30	70	100
4	IV	IV	30	70	100
5	V	V	30	70	100
6	V	VI	30	70	100
7	VI	VII	30	70	100
8	VI	VIII	30	70	100
			Total 560	+ 240	800

QUESTION PAPER PATTERN

I-VI SEMESTER

Sl. No	Types of question	Marks / Question	No. of Questions to be asked	No. of Questions to be answered	Total
1	Objective	1	05	05	05
2	Short answer	3	07	05	15
3	Medium Type	5	06	04	20
4	Long answer/ Essay	10	05	03	30
Total					70

Distribution of Internal Assessment for theory as C1 and C2:

1. Three class test for 5 marks each OR One class test for 15 marks will be conducted at the end of 8th and 16th week of the each semester for C1 and C2 components respectively.

Note: Examination question paper pattern will be followed for every class test.

SCHEME OF PRACTICAL EXAMINATION

a) Distribution of Marks (Semester wise):

Sl.No.	Semester	Paper	Marks for Internal assessment as C1 and C2	Marks for final practical examination as C3	Total
1	I	I	30	70	100
2	II	II	30	70	100
3	III	III	30	70	100
4	IV	IV	30	70	100
5	V	V	30	70	100
6	V	VI	30	70	100
7	VI	VII	30	70	100
8	VI	VIII	30	70	100
Total Marks for Practicals =240			+ 560	= 800	

b) Distribution of Marks for Practicals examination as C3:

Semester	Marks	Type	Marks	
I-IV	70 Marks	a) One question from Sericultural Botany Part.	25	
		b) One question from Silkworm Biology Part.	25	
		c) Identification and Commenting.	20	
	70 Marks	a) One major question	Pra. V-VII	Pra. VIII

V-VI	b) One minor question	20	20
	c) One minor question Or Tour/visit	15	15
	Report and viva voce	15	10
	Identification and Commenting	20	05
			20

Note: Questions will be covered from all sections

Internal assessment for practicals as C1 and C2:

Semester	Distribution	Marks
I-VI	a) Based on the performance of students at every practical / field work	10
	b) Submission of practical records/ herbarium and rearing report	05

SCHEME OF PRACTICAL EXAMINATION

Practical - DSC 1A: SERICULTURAL BOTANY AND SILKWORM BIOLOGY

Duration-3 hrs.

Max. Marks - 70

Q 1. Taxonomic description of any one of the popular mulberry varieties

(V1, M5, Mysore Local, S36 etc.,)

- 25 marks

Note: Distribution of marks

- a) Identification of the variety - 5
- b) Diagnostic features -16
- c) Sericultural importance - 4

OR

Sectioning and Mounting of Petiole, Leaf Lamina, Stem and Root.

Note: Distribution of marks

- a) Preparation -7
- b) Identification -10
- c) features and labeled diagram -8

Q 2. Any one of the following:

- 25 marks

Male/ Female reproductive system/ Silk glands/ Digestive system / Nervous system/Sex separation at larval/ Pupal / Moth stage.

Note: Distribution of marks

- a) Dissection/ Sex separation - 15
- b) Labeled diagram with description - 10

Q 3. Identify and comment on the spots A, B, C and D.

20 marks ---5 marks each.

Any FOUR from the practical syllabus

Practical – DSC 1B: MULBERRY CULTIVATION AND SILKWORM REARING

Duration-3 hrs.

Max. Marks - 70

Q 1. Determination of soil pH/ water holding capacity/ grafting/ layering.

- 25 marks

Note: Distribution of marks

- a) Procedure - 6
- b) Labelled Diagramme - 4
- c) To conduct Experiment - 15

Q 2. Calculations and procedure about disinfection/ brushing/ bed cleaning/ hatching

- 25 marks

Percentage.

Note: Distribution of marks

- a) Procedure/Description -15
- b) To conduct Experiment -10

Q 3. Identify and comment on the spots A, B, C and D.

20 marks —5 marks each.

Any FOUR from the practical syllabus.

Practical – DSC 1C: MULBERRY AND SILKWORM CROP PROTECTION

Duration-3 hrs.

Max. Marks - 70

- Q 1. Temporary mounting of any one of the following - 25 marks
Leaf spot/ leaf rust/ powdery mildew/ root knot nematode of mulberry.
Note: Distribution of marks
- a) Identification with binomial nomenclature - 5
 - b) Sectioning, staining and mounting - 15
 - c) Labelled diagram with description - 5
- Q 2. Temporary mounting of any one of the following. - 25 marks
Pebrine spore/ nuclear polyhedral bodies/ mycelia and conidial spores.
Note: Distribution of marks
- a) Identification - 5
 - b) Staining and mounting - 15
 - c) Procedure and diagram - 5
- Q 3. Identify and comment on the spots A, B, C and D. 20 marks —5 marks each.
Any FOUR from the practical syllabus.
-

Practical – DSC 1D: PHYSIOLOGY OF MULBERRY AND SILKWORM

Duration-3 hrs.

Max. Marks - 70

- Q 1. Separation of photosynthetic pigments/ water holding capacity of potato tubers / Stomatal Index/Estimation of protein in mulberry . - 25 marks
Note: Distribution of marks
- a) Procedure - 10
 - b) labeled diagramme - 5
 - c) To conduct Experiment - 10
- Q 2. Estimation of haemolymph glucose/amylase/ succinate dehydrogenase/glycogen/uric acid / haemolymph glucose/amylase/ succinate dehydrogenase/glycogen/uric acid. - 25 marks
Note: Distribution of marks
- a) Description with labeled diagram - 10
 - b) To conduct Experiment - 15
- Q 3. Identify and comment on the spots A, B, C and D. 20 marks —5 marks each.
Any FOUR from the practical syllabus
-

Practical –DSE 1A: CYTOGENETICS AND BREEDING OF MULBERRY AND SILKWORM

Duration-3 hrs.

Max. Marks - 70

- Q 1. Temporary squash preparation of mitotic/ meiotic chromosomes - 20 marks
Onion root tip/ grasshopper testis/ silkworm testis.
Note: Distribution of marks
- a) Procedure - 5
 - b) Staining and preparation of chromosomes - 8
 - c) Identification of stages - 6
 - d) Labelled diagram - 6
- Q 2. Assessment of cocoons of pure races for cocoon weight, shell weight and other racial Characters/Estimation of heterosis/inbreeding depression. - 15 marks
Note: Distribution of marks
- a) Procedure - 5
 - b) Experiment - 10
- Q 3. Evaluation of breeding parameters of different mulberry varieties/ mulberry hybridization experiments. - 15marks
Note: Distribution of marks
- a) Procedure - 5
 - b) Experiment - 10
- Q 4. Identify and comment on the spots A, B, C and D. --20 marks –5 marks each
Any FOUR from the practical syllabus.

Practical – DSE 2A: SILKWORM SEED TECHNOLOGY

Duration-3 hrs.

Max. Marks – 70

- Q 1. Cold/hot acid treatment of silkworm eggs/Estimation of DNA or RNA/Extraction of DNA . - 20 marks
Note: Distribution of marks
a) Procedure -8
b) Experiment - 12
- Q 2. Pupa/Mother moth examination. - 15 marks
Note: Distribution of marks
a) Procedure - 7
b) Experiment - 8
- Q 3. Any one of the following: - 15 marks
Sex separation of pupal or moth stage/loose eggs or laying preparation demonstration/hatching percentage
Note: Distribution of marks
a) Procedure - 7
b) Experiment - 8
- Q 4. Identify and comment on the spots A, B, C and D.
Any FOUR from the practical syllabus. - -20 marks –5 marks each
-

Practical – DSE 3A: SERIBIOTECHNOLOGY

Duration-3 hrs.

Max. Marks - 70

- Q 1. Separation of amino acids by chromatography/ synthetic seeds/Estimation of RNA/protease. - 25 marks
Note: Distribution of marks
a) Procedure - 10
b) labeled diagramme - 5
c) To conduct Experiment - 4.0
- Q 2. Preparation of the gel for SDSPAGE/native PAGE/preparation and loading of samples. - 25 marks
Note: Distribution of marks
a) Description with labeled diagram - 10
b) To conduct Experiment - 15
- Q 3. Identify and comment on the spots A, B, C and D.
Any FOUR from the practical syllabus 20 marks —5 marks each.
-

Duration-3 hrs.

Practical – DSE 2A: SILK TECHNOLOGY

Max. Marks - 70

- Q 1. Estimation of filament length/ reelability/ raw silk % recovery/ renditta/denier (any two)
From the given cocoons. - 20 marks
Note: Distribution of marks
a) Procedure - 10
b) Experiment - 15
- Q 2. Estimation of fibroin and sericin % from the raw silk/identification of textile fibers by
physical and chemical Tests. - 15 marks
Note: Distribution of marks
a) Procedure - 7
b) Experiment - 8
- Q 3. Any one of the following: - 15 marks
Identification, sorting and percentage determination of different types of cocoons/
Estimation of shell weight, shell %/ Determination of total alkalinity/ Water pH.
Note: Distribution of marks
a) Procedure - 7
b) Experiment - 8
- Q 4. Identify and comment on the spots A, B, C and D.
Any FOUR from the practical syllabus. --20 marks - 5 marks each
-

Practical –DSE 2B: NON-MULBERRY SERICULTURE, SERICULTURE EXTENSION AND ECONOMICS

Duration-3 hrs.

Max. Marks - 70

- Q 1. Taxonomy of non-mulberry food plants/Dissection of non mulberry silkworms. - 20 mark
- Note: Distribution of marks
- a) identification -4
 - b) classification - 6
 - c) diagnostic features - 8
 - d) sericultural importance - 2.0
- For dissection: Dissection ----- 10 marks
Display ----- 4 marks
Labelled diagram-- 6 marks
- Q 2. preparation of bar charts/graphs/pie charts/ handouts/pamphlets . - 15 marks
- a) calculation - 7
 - b) preparation - 8
- Q 3. Tour/Visit report. - 10 marks
- Q 4. Viva voce. - 05marks
- (For Viva Voce any seven questions should be asked)
- Q 5. Identify and comment on the spots A, B, C and D. -20 marks –5 marks each
- Any FOUR from the practical syllabus.
-

Practical –DSE 3B: APPLIED ENTOMOLOGY

Duration-3 hrs.

Max. Marks - 70

- Q 1. Identification with characteristic features of the given insect (any one from the practical syllabus) - 20 marks
- a) identification - 4
 - b) classification - 6
 - c) diagnostic features - 8
 - d) Importance - 2
- Q 2. preparation of the temporary slide of the given insect pathogens (any one from the practical syllabus) - 15 marks
- a) Identification, labeled diagram and features - 10
 - b) preparation - 5
- Q 3. Tour/Visit report. - 8 marks
- Q 4. Viva voce. - 7 marks
- (For Viva Voce any five questions should be asked and minimum of 2 marks must be awarded to each student)
- Q 5. Identify and comment on the spots A, B, C and D. -20 marks –5 marks each
- Any FOUR from the practical syllabus.
-

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