डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यास क्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

..2..

[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

****

या परिपत्रकाची एक प्रत :-

१) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
२) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थंळावर उपलब्ध करुण देण्यात यावेत.
४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

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Dr. Babasaheb Ambedkar Marathwada University,

Aurangabad.

Revised Syllabus of

B.Sc. Sericulture Technology

First Year

(I st and II nd Semester)

Three Year Degree Course

(Effective for the academic year2014-15)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

As per the decision of academic council meeting held on 8/11/2012

1. Dr. Ram Chavan	**Chairman**
2. Dr. ChandrashekahrHiwre	**Member**
3. Dr. Mohan Babre	**Member**
4. Dr. Mukund Mohrir	**Member**
5. Dr. Narayan Pandhure	**Member**
6. Dr. Pradeep Bramhapurikar	**Member**

(Semester pattern)

First Semester

Semester	Course code	Paper No.	Paper title	Marks
I	**SET-101**	**Paper-I**	Communication Skill	**50**
	SET-102	**Paper-II**	General Sericulture	**50**
	SET-103	**Paper-III**	Biology of Mulberry	**50**
	SET-104	**Paper-IV**	Soil science and economics of mulberry	**50**
	SET-105	**Paper-V**	Agronomy of mulberry	**50**
	SET-106	**Paper-VI**	Management of Mulberry and Economics	**50**
	SET-107	**Paper-VII**	Practical	**50**
	SET-108	**Paper-VIII**	Practical	**50**
	SET-109	**Paper-IX**	Practical	**50**
	SET-110	**Paper-X**	Practical	**50**
Second Semester				
	SET-111	Paper XI-	Fundamentals of Computer	**50**
	SET-112	Paper XII-	Biology of Silkworm	**50**
	SET-113	Paper XIII-	Silkworm Rearing Technology	**50**
	SET-114	Paper XIV:	Development biology and physiology of silkworm	**50**
	SET-115	Paper XV	Diseases and pests of Silkworm.	**50**
	SET-116	Paper XVI-	Silkworm seed production	**50**
	SET-117	Paper XVII -	Practical	**50**
	SET-118	Paper XVIII-	Practical	**50**
	SET-119	Paper-XIX-	Practical	**50**
	SET-120	Paper-XX	Practical	**5**

SEMESTER-I

Paper-I

COMMUNICATION SKILLS IN ENGLISH

UNIT 1

1.1 Introduction

1.2 The Importance of English

1.3 English as the First or Second language

1.4 Uses of English

1.5 Other Uses of English

UNIT 2

LISTENING SKILLS

2.1 What is Listening?

2.2 Types of Listening

2.3 Objectives

2.4 Active Listening- an Effective Listening Skill

2.5 Note Taking Tips

2.6 Barriers for Good Listening

2.7 Purpose of Listening

2.8 Outlines and Signposting

2.9 Gambits

2.10 Exercise

UNIT 3

READING SKILLS

3.1 Importance of Reading

3.2 Definition of Reading

3.3 Levels of Reading

3.4 Requirements of Reading

3.5 Types of Reading

3.6 Techniques of Reading

3.7 Academic Reading Tips

3.8 Exercise

UNIT 4

WRITING SKILLS

4.1 What is writing?

4.2 The Sentence

4.3 The Phrase

4.4 Kinds of Sentences

4.5 Parts of Sentence

4.6 Parts of Speech

4.7 Articles

4.8 Types of Sentences

4.9 Time Management Tips

4.10 Test Preparation Tips

4.11 Tips for Taking Exams

4.12 What is a Paragraph?

4.13 Construction of Paragraph

4.14 Linkage and Cohesion

4.15 Example

4.16 Exercise

4.17 Academic Essay Writing

4.18 Thesis

4.19 Procedure for Thesis Approval and Deposit

4.20 Summary

4.21 Precis Writing

4.22 Report Abstracts

4.23 Letter Writing

4.24 Memo

4.25 Cover Letter

4.26 Resume writing

UNIT 5

COMMUNICATION SKILLS- SPEAKING SKILLS

5.1 Definition

5.2 Barriers of Communication

5.3 Types of Communication

5.4 Know What You Want To Say

PAPER-II:

GENERAL SERICULTURE

Unit-1

1. Introduction to Sericulture, scope

2. Origin and history of Sericulture, silk route

3. World output of silk, other natural fibres and manmade fibres. Importance of natural fibresvis -à-vis manmade fibres – Role of silkfibres amongst natural fibres.

Unit-2

4. Silk industry in the World - Silk industry in China, Japan, SouthKorea, North Korea, India, USSR, France, Italy, Brazil, Thailand,Iran, Sri Lanka, Bangladesh, Pakistan and other countries

5. Silk industry in India, West Bengal, Jammu & Kashmir, Karnataka,Tamil Nadu, Andhra Pradesh and other states (Mulberry and non -Mulberry Sericulture). Mulberry area Cocoon production, silk production,Number of reeling units (Charka, Cottage, Basin, Filature basin, Handloomsand Powerlooms.

Unit-3

6. Prospects and problems of Sericulture, Qualities of different types of Textilefibres - Advantages of silk fibres over other fibres – International demandfor silk – constraints in silk production like labour, land, environmental conditions,skill and production cost.

7. Organisation of Sericulture industry in India – Government of India – CentralSilk Board – State Departments of Sericulture

Unit-4

8. Mulberry silkworm and its food plants – Mulberry sericulture – Silkworm racesClassification of Mulberry silkworm on the basis of its origin and voltinism.

9. Non-mulberry – their food plants. Different species of non -mulberry silkworm.Brief account of :

a) Tasar food plants

b) Muga food plants

c) Eri food plants

Types of cocoon and silk produced by them

10. Outline of different reeling machineries and reeling process. History of Reeling Industry- Charka- Cottage basin- Filature basin- Multi end basinSemiautomatic and Automatic reeling machinery - Different types of cocoonstifling – Different types of cocoon cooking – Principles of reeling, reeling process.

Paper-III

Biology of Mulberry

Unit-I: Introduction

1. **Sericulture:** Definition, history and present status.
2. **Silkworms:** Types of silkworms, their food plants and distribution.
3. **Silk production:** Mulberry and non-mulberry cocoon and yarn

Unit-II: Sericulture Centers

1. Research training and extension.
2. Seed production, reeling, re-reeling, twisting, doubling, weaving, processing and tradingcentres.
3. Central Silk Board (CSB) : Role in Extension and development.
4. Directorate of Sericulture: Extension and development in sericulture on state level.

Unit-III : Mulberry plant morphology

1. Mulberry species: Classification, distribution and common varieties used inSericulture in India.
2. **Vegetative morphology:** Characters of root, stem, bud and leaf.
3. **Anatomy:** Root, stem and leaf.
4. **Reproductive morphology:** Male and female reproductive organs, pollination, fertilization and development of seed, structure of seed and fruit.

Unit –IV: Propagation of mulberry plant

1 Sowing: Seed-sowing, growth and development of mulberry saplings, dormancyperiod of seed.

2 Saplings: Selection, preparation and pit systems.

3 **Plantation methods:** Row and Pit systems

4 **Mulberry leaves:** Chemical composition and their nutritional value

PAPER IV:

SOIL SCIENCE AND ECONOMICS OF MULBERRY

Unit –I: Edaphic and climatic factors requirement for Mulberry

1. Soil: Physical and chemical properties

2. Soil nature: Acid soil, saline soil, calcareous soil, eroded soil

3. Soil water: Soil moisture, water requirements.

4. Climatic conditions: Temperature, photoperiod, humidity and rainfall

Unit-II: Agronomical practices for mulberry

1. Land preparation: Soil, Leveling and ploughing.

2. Irrigation: Drip irrigation, Sprinkler irrigation, flood irrigation drainage, weeding

3. Manuring: Organic, inorganic, biofertilizers.

4, Profitable cultivation: Proper selection of the land, selection of proper varieties of Mulberry, regular manuring, weeding and irrigation and disease control.

Unit III: Mulberry Cultivation and Preharvest and Postharvest Practices.

1. Pruning: Bottom pruning, middle pruning and repeated pruning.

2 Harvesting: Various methods—leaf picking, shoot-leaf harvesting, branch cutting.

3 Leaf storage: Wooden leaf chamber, transportation and preservation

4 Leaf yield: Estimation of leaf yield per unit area-acre/hectare

Unit-IV: Economics

1. Irrigated Cultivation cost: Cost of mulberry cultivation per unit area under irrigated condition.

2. Non-irrigated cultivation cost: Cost of mulberry cultivation under rain fed condition.

3. Temperate region cultivation: Cost of mulberry cultivation in temperate region.

4. Cost-benefit ratio: Cost-benefit ratio of mulberry cultivation in local region per unit area.

PAPER-V:
AGRONOMY OF MULBERRY PLANT

I). Establishment of mulberry gardens:

i) Strategies of long term basis: Intensive cultivation for high leaf productivity and quality

ii) Cropping patterns : mono crop and mixed crop

iii) Selection and preparation of site

iv) Selection of varieties for cultivation

v) Different planting materials and their practical relevance in various agro climate conditions

vi) Planning systems : advantages and disadvantages and recommended systems.

vii) Spacing of mulberry and its significance in leaf productivity and quality under various field conditions.

viii) Time and type of initial harvests and their effect on the young plant

ix) Measures to promote development of root system and long term significance

ii. **Mulberry cultivation practices :** (under irrigated and dry land conditions)

a) Water requirement of mulberry in different field situations and seasons

b) Water resources, irrigation systems (surface, sub soil, sprinkler and drip systems) and their practical relevance

c) Water quality and its effects on soil productivity

d) Periodicity and quantity of irrigation

e) Over irrigation and its effects

f) Drainage : Methods and importance

g) Sewage water irrigation and its effects. Treatment for irrigation

iii) Water management practices in dry land mulberry :

a) Land leveling, bunding, contour bunding. *In situ* moisture conservation practices and rain water re-cycling.

b) Mulching : Purpose, methods(surface and sub -soil mulching).

Mulching materials and cost effectiveness.

iv) Manures and their applications :

a) Basic approaches in mulberry cultivation

b) Natural farming and vermiculture

c) Organic manures : types (FYM ; Compost). Method of compost preparation and its use in mulberry fields, Advantage and constraints.

d) Biofertilizers : Types, importance, application methods and limitations.

e) Chemical fertilizers : role of major nutrients and trace elements in plant growth. Types .Importance ofchmical fertilizers in mulberry cultivation. Chemical composition of different fertilizers, Fertilizersdoses and schedules of application for irrigation and rain fed gardens. Calculation of required dosagesfor a given unit area. Soil test based fertilizers application and its significance. Storage of chemicalsfertilizers.

f) Foliar nutrition : Foliar nutrients and commercial formulations, scope and limitations.

iv) Inter-cultivation practice; Purpose, methods, time and f requency.

v) Common weeds of mulberry, their effect on mulberry, productivity and quality and control measures.

vi) Pruning and training objectives: Types and methods of pruning and importance, utility of mulberrypruning in sericulture management practices.

vii) Harvesting : Effects of harvest on mulberry plant. Harvesting methods (Leaf and shoot harvest) in relationto cultivation and rearing practices. Stages and times of harvest. Transportation and preservation methods.

viii) The schedules of package of practices of mulberry cultivation.

a) Irrigated gardens

b) Rain fed gardens

Paper-VI

Management of Mulberry and Economics

Unit-I: Mulberry management

1. Land preparation: Soil, Levelling and ploughing.

2. Irrigation: Drip irrigation, Sprinkler irrigation, flood irrigation drainage, weeding

3. Manuring : Organic, inorganic, biofertilizer.

4 Profitable cultivation: Proper selection of the land, selection of proper varieties of mulberry, regular manuring, weeding and irrigation and disease control.

Unit II: Mulberry Cultivation and Harvesting (9 periods)

1. Pruning : Bottom pruning, middle pruning and repeated pruning.

2 Harvesting : Various methods—leaf picking, shoot-leaf harvesting, branch cutting.

3 Leaf storage : Wooden leaf chamber, transportation and preservation

4 Leaf yield : Estimation of leaf yield per unit area-acre/hectare

Unit-iii: Economics (9 periods)

1. Irrigated Cultivation cost : Cost of mulberry cultivation per unit area under irrigated condition.

2. Non-irrigated cultivation cost : Cost of mulberry cultivation under rain fed condition.

3. Temperate region cultivation : Cost of mulberry cultivation in temperate region.

4. Cost-benefit ratio : Cost-benefit ratio of mulberry cultivation in local region per unit area.

Mulberry Management

a) Significance of 'leaf cocoon ratio' concept

b) Measures of the maintenance of high soul productivity

c) Exclusive mulberry garden for chawkirearing : concept and methods.

d) Maintenance of mulberry plots in relation to rearing schedules

e) Requirements, organization and management of labour

f) Maintenance of farm records and their relevance

g) Farm implements and machinery

Paper – VII (Practical)

General Sericulture

A. General Sericulture :

1. Sericulture maps - a) World map of silk road

b) India

2. Organisation set up in India –

a) Government of India

b) Fire traditional states-

Karnataka, Andhra Pradesh,

Tamil Nadu, West Bengal,

Jammu and Kashmir.

3. Identification and study of sericulture production :

a) Cotton and silk yarn types

b) Pupae

c) Silk waste

d) Spun yarn

e) Nail yarn

f) Other byproducts

4. Preparation of Histograms on World output :

a) of silk and other textile fibre

b) World output of silk fibre of different countries

5. Preparation of line graph on trend of silk yarn and other textile fibre production over a period of 10 years.

a) Pie-chart on output of different types of silk production in India

b) Pie-chart on Mulberry silk production in different States.

Paper – VIII (Practical)

Silkworm Biology and Rearing technology

A. Silkworm Biology :

1. **Morphology** :

a) Mouth parts of silkworm

b) External morphology of larva, pupa and moth

c) Sex separation of larva, pupa and moth

B. **Anatomy** :

Digestives system, silk gland, nervous system, reproductive system of silkworm.

8. Cocoon chararters of uni, bi and multivoltine races.

9. Mounting of different stages of embryos.

C. Rearing Technology : (Marks 25)

10. Rearing appliances – utilization of rearing appliances for 100dfls.

11. Effective concentration of disinfectants, preparation of disinfectants – Uzi control-use of nets.

12. Incubation of silkworm eggs – black boxing and hatching, recording temperature and humidity.

13. Mulberry leaf estimation – harvesting – preservation techniques – leaf selection for different instars.

14. Identification of moulting larva.

15. Assessment and preparation of harvest report – mountages.

D. Viva – Voce :

E. Laboratory note book :

Paper –IX (Practical)

Unit – I : Soil Science

1. Study of different types of soil

2. Soil Sampling

3. Determination of saturation capacity of soil

4. Soil analysis for pH and electrical conductivity

5. Determination of organic carbon by colorimetric method

6. Determination of available nitrogen by alkaline permanganate method

7. Determination of available phosphorus

8. Determination of available potassium

9. Visit to a soil testing laboratory

10. Visit to a Watershed

Paper-X (Practical

Biology of Mulberry

1. Morphology and anatomy of few important mulberry cultivars.

2. Propagation methods :

a) Preparation of nursery beds

b) Collection of fruits and separation of viable seeds, seed sowing, seed Bed maintenance and rising of seedlings.

c) Selection of materials for cutting, preparation and selection of cuttings, Planting and raising of saplings in nursery beds and polythene bags, Selector and grading of saplings.

d) Preparation of various types of grafts and their maintenance.

e) Simple, air and trench layering techniques.

3. Farm implants and machinery

4. Preparatory practices for mulberry establishment.

5. Pit system and row system of planting

6. Different forms of mulberry training and methods of irrigation (Demonstration)

7. Identification of different types of fertilizers, Calculation of doses (Excereise)

8. Preparation of compost

9. Mulching practices and *in situ* moisture conservation practices

10. Identification of common weeds of mulberry and weeding

11. Estimation of leaf yield and harvesting methods.

12. Preparation of various formals for maintenance of farm records (Exercise)

13. Preparation of flow chart of Annual schedules of operations for 1 ha. Of Irrigated mulberry and also of rain fed

Mulberry (Exercise).

SEMESTER-II

Paper XI: FUNDAMENTALS OF COMPUTER

UNIT-I

i. **Introduction to Information Technology :** Basic concepts of IT, Data Processing: Data and Information.

ii. **. Introduction to Computers:** Classification, History, Types of Computers.
iii. **Elements of a Computer System:** Block Diagram of The Computer System, Introduction to various units.
iv. **Hardware:** CPU, Memory, Input and Output devices, Auxiliary storage devices.
v. **Software:** System and Application Software, Utility packages, Configuration of Computer System
vi. **Applications of Information Technology:** Wide range of applications in: Home , Education and Training, Entertainment , Science, Medicine, Engineering etc.

UNIT-II

i. **Introduction to Information Technology Tools:** Operating System, Programming Languages, Features and trends.
ii. **Introduction to MS-DOS/WINDOWS/LINUX/UNIX**
iii. **Office Automation Tools:** MS-Office, Word, Power point, Excel, Access, Working with PC PACKAGES.
iv. **Translators:**Assembler , Compiler and Interpreter.

UNIT-III

i. **Business Files:** Concept of Character, Field, Record and File.
ii. **Types of Data Files:** Master File, Transaction File, Archival File.
iii. **Keys:** Primary Key, Secondary key, Foreign key etc.
iv. **File Organization:** Sequential file, Indexed Sequential file, Random files. Comparison of various type of file organization. Choice of Files Organization, Design of Computer Data Files, Files Security and Back-Up. A brief Introduction to Database Management Systems (using Access/MySQL)

UNIT-IV

i. **Computers and Communication:** Introduction to Computer Networks, Internet and World Wide Web, FTP, Electronic Mail.
ii. **ii. Web Development Tools :** FrontPage, HTML.
iii. **Information Security and Integrity:** Basic Concepts, Perverse Software, Preventive Measures and treatments.
iv. **Laboratory:** Working with DOS, Linux/Unix and Windows O.S., MS-Office, Web Design using HTML and FrontPage.

PAPER XII- BIOLOGY OF SILKWORM

Unit-I : Silkworm taxonomy and distribution

1. Classification and Taxonomic characters : Phylum, class, order, family, genus and species..

2. Moultinism and voltinism : Univoltine, bivoltine and multivoltine races.

3. Distribution and Races :.: Geographical distribution in the world and India and Exotic and indigenous races

4. Life cycle : Egg, larvae, pupa and adult, life span and bionomics, circadian rhythm and behavior and growth rate.

Unit-II : Morphology

1. Egg : External and internal morphology and colour change.

2. Larvae : Mouth parts, legs, prolegs, spircles, eyes, claspers and integumentary hair and sexual markings.

3. Pupa : Male and Female Morphology and sexual dimorphism

4. Adult **:**Mouth parts, antenna, wings, external genitalia.

Unit-III : Anatomy of physiology

1. Digestive system : Alimentary canal and physiology of digestion.

2. Silk glands : Structure, development and mechanism of silk synthesis.

3. Circulatory system : Dorsal vessel, haemolymph and haemocytes.

4. Reproductive system : Male and female systems, mechanism of egg development.

Unit-IV: Endocrine and Exocrine glands

1. Endocrine system: Endocrine glands in lava and pupa and synthesis of hormone.

2. Hormonal control: on metamorphosis, diapauses, silk synthesis and reproduction.

3. Exocrine glands: Structure, morphology and secretion of exocrine glands.

4. Pheromone:sex attractants and their role in mating.

PAPER- XIII:

SILKWORM REARING TECHNOLOGY

Unit-I : Silkworm rearing house and appliances

1. Rearing house : Construction of ideal rearing house at suitable site and of suitable size, representing CSB model.

2. Early age rearing appliances : Rearing appliances for early age rearing

3. Late age rearing appliances: Rearing trays, ant-wells, rearing stands and racks,paraffin papers, rubber foam pads, net, chopsticks and feathers.

4. Mountages: Bamboo, plastic, nylon, Spectronic 20, Balances (Digital).

Unit –II: Disinfectants and feeding appliances

1 Disinfectants: Formalin, bleaching powder, RKO,

2 Disinfectant appliances: Sprayers and dusters.

3. Feeding appliances: Leaf chambers, chopping knife and chopping board.

4. Humidity and Temperature control devices : Humidifiers, thermostats, heaters, hygrometers, and conditioners, incubator and BOD incubator, Blowers.

Unit-III : Silkworm rearing technology (Early age rearing)

1. Commercial races: Multivoltine, bivoltine and hybrid races used in India.

2. Seed : Collection of disease-free layings (DFLs), cards, loose eggs, incubation.

3. Hatching and Brushing: Uniform hatching and Brushing methods for I instar larvae

4. Rearing of early instars (Chowki rearing). : Feeding and rearing of I, II and III instar larvae

Unit-IV: Late age rearing

1. Rearing of Late instars: Rearing, spacing, feeding, cleaning and dusting, rearing methods.

2. Mounting and cocoon production: Types of mountages, transfer of matured silkworms, spinning of cocoons.

3. Harvesting and storage of cocoons: Harvesting, preservation, assessment, storage

4. Transportation: Cocoons, record maintenance, cost of cocoon production, leafcocoon ratio.

Paper-XIV

Rearing technology and Silkworm seed production

Unit-I

- Rearing Plan.
- Rearing and Environment.
- Disinfections and hygiene-principle of disinfection, types of disinfectants, disinfecting methods-preparation of solution-maintenance of hygienic conditions in the rearing house.
- Incubation technology and its requirements.
- Biotic and Abiotic Stimuli for Hatching; Time of Hatching.
- Methods of Brushing, Bed Cleaning and Spacing in young age larva.
- Characteristics and types of Young Silkworms.
- Late age Rearing Technology.
- Bi-voltine rearing Technology.
- Technology for rearing methods: Shelf, Shoot and Floor Rearing.
- Management of bed cleaning, spacing, feeding, mounting and control of disease in late age silkworms.
- Leaf Storage and preservation technology for different scales of rearing.
- Mounting; Features of mountage; Time for mounting; Methods of mounting; Care during cocooning.
- Cocoon harvest technology.
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Unit-II

- Types of seed - industrial and reproductive seed, loose eggs, sheet eggs.
- Seed Cocoon Marketing – Procurement – Norms – Price Fixation – Testing, harvesting and Transportation of seed cocoons.
- Seed Production Process – disinfection methods, sorting, seed cocoon preservation, pupae sexing, emergence of moths, isolation, Pairing and depairing, egg laying, moth examination, surface disinfection, quality control.
- Acid Treatment – hot acid and cold acid, short term chilling and acid treatment, Long term chilling and acid treatment.
- Hibernation schedules – three months, four months, six months, and ten months.
- Refrigeration techniques of moth’s egg and preservation of cocoons.
- Transportation of eggs, methods of transportation, precautions on incubation of eggs.

Paper-XV
Silk Reeling and Extension

Unit 1

- Textile Fibers – Introduction on natural and manmade fibers – silk, wool, cotton, nylon, polyster, rayon etc. Different varieties of commercial silk – physical and chemical properties of silk – importance of silk and its uses..
- Assessment of cocoon properties, shell ratio, filament length, filament size, reelability %, estimated renditta, raw silk %.
- Different types of defective cocoons, Cocoon sorting Methods, Effect of defective cocoon in the reeling.
- Physical and commercial characters of mulberry cocoons viz. multivoltine, bivoltine etc.

Unit: 2

Cocoon Stifling, objectives of stifling, suitable stifling methods according to cocoon quality viz. multivoltine, bivoltine etc..
Open pan, three pans, pressurized cooking, conveyer cooking, merits and demerits of cocoon cooking methods.
Cocoon Brushing – importance of brushing, different devices for brushing, bamboo stick, coconut stick, paddy straw, hand brushing, mechanical brushing.
Reeling- definition of reeling, principle involved – direct system and indirect system of reeling, croissure purpose, croissure pulley, chamben type and travelette type croissure,
Slub Catching Device and its function- Jettebout, Reel casting counter, yarn distributor, Functions of reeling devices and their effect on reeling efficiency and raw silk quality.
Silk reeling machines viz. charkha, cottage basin, and multiends reeling machine.

Unit: 3

Silk Re-reeling, purpose, Structure of Re-Reeling Machine..

- Raw Silk Testing, Visual examination of raw silk, Sampling of raw silk, winding test, size test, evenness test, cleanness test and neatness test, tenacity and elongation – cohesion test.
- Raw Silk Grading, International Standards (IS) – Bureau of Indian Standards (BIS).
- Reeling Water, Consumption of water by reeling industry, Water quality, suitable water for cocoon cooking and reeling, influence of water on cooking, reeling and on raw silk quality.
- Silk Throwing, Degumming, Bleaching, Dyeing, Fabric Finishing.
- Silk Exchange, Function of silk exchange, Factors influencing price of raw silk, Price Stabilization, Role of Government agencies in price Stabilization.

Unit: 4

- Extension Education..
- Sericulture Education System.
- Extension Programme Management.
- Adoption and Diffusion of Innovations.

- Extension and Communication.
- Extension Teaching Methods.
- Audio-visual Aids in Extension.
- Training.
- Management of Extension organizations.
- Role of N.G.O's in Sericulture.

Unit – XIV :

Diseases and pests of Silkworm

1. Introduction and classification of different types of silkworm diseases

Influence of environment and Nutrition on the incidence of diseases.

2. **Protozoon disease and pebrino** - symptomology, structure and life history of Nosemabombycis- sources and mode of infection- prevention and control.

3**. Bacterial diseases flacherie** - symptoms of different typesflacherie disease - causative agents, factors influencing Flacherie, sources and mode of infection - prevention and control.

4. **Viral diseases- grasserie-** symptoms of different types of viral diseases, causative agents, structure and life cycle of NPV, CPV - Kenchu& DNV viruses, sources and mode of infection, protection and control.

5. **Fungal diseases-**Muscardine-symptoms of different types of fungal diseases- causative agents, structureand life cycle of *Beauvaria*, mode of infection, prevention and control.

6. **Aspergillus disease-** Symptoms, causative agents, structure and life cycle of *Aspergillus* Sp.mode of infection, prevention and control.

7. General account of disinfection and relative efficiencies of different disinfectants.

8. **Silkworm pests :** Life cycle of machined fly -Nature of damage, alternate host and otherimportant behaviors in relation to mating, oviposition and flight, prevention, chemical control (ovicidal and chemical attractants), useful natural enemies of Tachinid flies, integrated management against tachin id fly, dermestid beetles : biology, prevention and control . Nature of damage, Prevention and control of other pests like ants, rodents and lizards.

9. Life cycle and methods of important natural enemies of pests of silkworm and mulberry.New strategies, use of kairomones, pheromones, growth regulators, autodial methods.

Necessity and concept of IPM with case studies against :Tachinid fly and Mealy bug.

Paper – XVII (Practical)
General sericulture

A. General Sericulture :

1. Sericulture maps –

a) World map of silk road

b) India

2. Organization set up in India –

a) Government of India

b) Fire traditional states-Karnataka, Andhra Pradesh,Tamil Nadu, West Bengal, Jammu and Kashmir.

3. Identification and study of sericulture production:

a) Cotton and silk yarn types

b) Pupae

c) Silk waste

d) Spun yarn

e) Nail yarn

f) Other byproducts

4. Preparation of Histograms on World output :

a) of silk and other textile fibre

b) World output of silk fiber of different countries

5. Preparation of line graph on trend of silk yarn and other textile fibre production over a period of 10 years.

a) Pie-chart on output of different types of silk production in India

b) Pie-chart on Mulberry silk production in different States.

B. Silkworm Biology :

6. **Morphology** :

a) Mouth parts of silkworm

b) External morphology of larva, pupa and moth

c) Sex separation of larva, pupa and moth

7. **Anatomy** :

Digestives system, silk gland, nervous system, reproductive system of silkworm.

8. Cocoon chararters of uni, bi and multivoltine races.

9. Mounting of different stages of embryos.

XVIII- (Practical)

Silkworm technology and rearing biology

C. Rearing Technology :

10. Rearing appliances – utilization of rearing appliances for 100dfls.

11. Effective concentration of disinfectants, preparation of disinfectants – Uzi control-use of nets.

12. Incubation of silkworm eggs – black boxing and hatching, recording temperature and humidity.

13. Mulberry leaf estimation – harvesting – preservation techniques – leaf selection for different instars.

14. Identification of molting larva.

15. Assessment and preparation of harvest report – mountages.

D. Silkworm biology :

a) Morphology- Egg, last instar larva, pupa, adult, sexual dimorphism, mouthparts, antennae, legs, prolegs, wings.

b) Anatomy-Dissection of alimentary canal, silk gland of larva and reproductive system of adult.

c) Preparation of total haemocyte count (THC).

d) Study of appliances—Types of trays and racks, types of mountages, humidity and temperature devices, dusters and sprayers.

e) Silk products—Silk wastes, spun yarn, noil yarn and other byproducts.

f) Visit to various sericulture centres.

PAPER-XIX (Practical)

DISEASES AND PESTS OF SILKWORM AND MANAGEMENT

Unit-I : Basic concepts of silkworm diseases

1. Varieties of silkworm diseases, etiology
2. Pathogenesis of diseases.
3. Influence of environment and nutrition on the incidence of diseases.
4. Resistance of silkworm to diseases.

Unit-II : Viral and Protozoan diseases (Etiology, Structure, Symptoms , Lessions, Pathogenesis).

1. Nuclear polyhydrosis virus (NPV) and Cytoplasmic, polyhydrosis virus (CPV)
2. Infectious flacherie virus (FV) and Densonucleosis virus (DNV).
3. Preventive measures and control of viral diseases

4 *Noesmabombycis*(Pebrine disease) and Preventive measures

Unit-III: Bacterial diseases (Etiology, Structure, Symptoms, Lessions, (Pathogenesis)

1. Bacterial septicemia (*Bacillus* sp. And *Serriatemarcenscens*).
2. Bacterial gastroenteric disease (*Streptococcus* sp.)
3. Bacterial toxicosis (*Bacillus thuringiensis)*
4. Preventive measures and control of bacterial diseases

Paper- XX (Practical)

Diseases of Silkworm

Unit I: Fungal Diseases (Etiology, Structure, Symptoms, Lessions, (9 periods)

Pathogenesis) and Pests of Silkworms

1. Fungal diseases—white muscardine*(Beauveriabassiana)*, Green muscardine *(Nomuraearilevi)*, Yellow muscardine*(Isaria farinose)* and Aspergillosis.

2 Preventive measures and control of fungal diseases.

3 Silkworm pests—Tachinid Fly (Uzifly) *Trycholgzabombycis*, Dermistid beetles, *Dermestescadniverinus*—Biology, nature of damage and control.

4 Vertebrate and other silkworm pests and their control.

Unit II- Pests and Diseases of Silkworm and Mulberry

a. Microscopic preparation of pebrine causative agents in larva and adult by Giemsa staining method.

b. Microscopic preparation of grasserie causative agents in the larva.

c. Identification of flacherie and muscardine symptoms.

d. Collection of mulberry disease sample and preservation.

e. Preparation of fungicide formulations.

f. Microscoipic preparation of mulberry fungi, viruses and bacteria causing diseases.

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