



UNIVERSITY OF CALCUTTA

Notification No. CSR/93/2025

It is notified for information of all concerned that in terms of the provisions of Section 54 of the Calcutta University Act, 1979, (as amended), and, in the exercise of his powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 26.11.2025 approved the Semester-5 Syllabus of Sericulture (Core vocational) under CCF, 2022.

The above shall take effect from the Odd Semester Examinations, 2025 onwards.

SENATE HOUSE

Kolkata-700073

09.12.2025

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Prof.(Dr.) Debasis Das

Registrar

PART III; SEM V

VSEM DSCC 9	SERICULTURAL STATISTICS AND ECONOMICS	75	25
VSEM DSCC 10	AGRICUTURAL ENTOMOLOGY	75	25
VSEM DSCC 11	CROP PHYSIOLOGY	75	25
VSEM DSCC 12	FORESTRY & ENVIRONMENTAL SCIENCES	75	25

VSEM DSCC 9.TH	SERICULTURAL STATISTICS AND ECONOMICS 50 HOURS
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UNIT 1:**10 Hours**

Introduction to Statistics and its Applications in Sericulture, Classification & Frequency Distributions of data, Diagrammatic Representation of Data: Bar & Pie diagrams, Graphical Representations of Data: Histogram, Frequency Polygon, Frequency curve and Cumulative frequency curve (Ogives). Measures of Central Tendency: Concepts & Definition, Characteristics of ideal Average, Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean (Ungrouped data). Measures of Dispersion: Concepts & Definition, Types of Measures of Dispersion: Range, Absolute Mean Deviation from mean and median, Standard Deviation and Variance, Theoretical Probability distributions: Binomial, Poisson and Normal Distribution, their Properties & Applications.

UNIT 2:**08 Hours**

Simple Correlation Analysis: Definition, Measures of Correlation: Scatter diagram, Karl Pearson product moment and Spearman's rank correlation coefficients and their properties. Simple Linear Regression Analysis: Definition, Fitting of simple linear regression equations Y on X and X on Y, Properties of regression coefficient, interrelation between correlation and regression.

UNIT 3: :**08 Hours**

Introduction to Sampling Theory: Sampling versus Complete Enumeration, Methods of Sampling, Type of Sampling- Simple Random Sampling (with and without replacement), Use of Random Number Tables for selection of Simple Random Sample, Concept of Sampling distribution and standard error, concept of systematic, stratified and cluster sampling along with their advantage & disadvantages.

UNIT 4:

08 Hours

Test of Significance: Introduction, Null & Alternative hypothesis, Types of Errors, Level of significance, degrees of freedom, Critical & Acceptance regions. Z-Test for Means - One and Two sample Means for Known and Unknown population variance. Small sample test: Student t-test for Means - One and Two sample means, Paired t-test and F-test for two population variances. Chi-Square test: Test for Goodness of Fit, 2x2 contingency table with Yates correction, and test for single population variance.

UNIT 5 :

08 Hours

Introduction to Analysis of Variance and its Assumptions, Analysis of Variance for One & Two Way Classification. Concept of design of experiments: Basic Principle of Experimental Design: Randomization, Replication & Local control.

UNIT 6:

08 Hours

Economics: Principles of economics, micro and macroeconomics; classification of costs – explicit And implicit, fixed, variable, marginal, average; profits – gross and net. Advantages and characteristics of sericulture. Scope of sericulture in India – Vis-à- Vis other agricultural crops - income and employment generation. Economics of silkworm egg production in government and private grainage. Economics of mulberry production under rain-fed and irrigated systems; comparative economics of mulberry production under traditional and improved practices. Economics of raw silk production in charka, cottage basin and multi-end reeling units.

THEORY QUESTION PATTERN

For all Core Papers

Theory (Full Marks 75)

Section A (Short questions, ten short questions)

- Students will answer ten questions (each of 2 marks) out of 15 questions.
2 x 10 = 20 marks

Section B (Short Notes, 3 short notes)

- Students will write 3 short notes (each of 5 marks) out of 5 short notes.
3 x 5 = 15 marks

Section C (Broad question, 4 questions)

Students will write four questions (each of 10 marks) out of seven questions.

10 x 4 = 40 marks

PRACTICAL SYLLABUS

20 HOURS

1. Construction of Frequency Distribution tables. Diagrammatic presentation of data: Bar diagrams & pie diagrams. Graphical Representation of Data: Histogram, Frequency polygon, Frequency curve and Cumulative frequency curve (Ogives). Computation of Measures of Central Tendency: Arithmetic Mean, Median, Mode.

04 Hours

2. Computation of Measures of Dispersion: Range, Quartile deviation, Absolute Mean Deviation, Standard Deviation and Variance and Co-efficient of dispersion (both for Ungrouped and Grouped data). Problems on permutation and combination. Problems on Simple Probability, Addition and Multiplication rules. :

04 Hours

3. Computation of probabilities using Binomial, Poisson and Normal Distributions. Computation of Correlation Coefficient: Karl Pearson product moment and Spearman's rank correlation coefficients. Use of Random Number Tables for selection of Simple Random Sample. :

04 Hours

4. Problems on Large sample tests: Z-Test for Means - One and Two sample means for known and unknown population variance. Problems on Small sample

tests: Student t-test for Means - One and Two sample means, Paired t-test, and F-test two population variances. Problems on Chi-Square test: Test for Goodness of Fit, 2x2 contingency table with Yates correction and test for single population variance

04 Hours

5. Mulberry cultivation (per hectare): Cost-return from irrigated and rain fed condition , Visit to field and farmers rearing house (Economics of silkworm rearing: Investment and return) , Visit to silk reeling establishments (Economics of silk reeling: cost and returns for different types of reeling establishment.

04 Hours

PRACTICAL QUESTION PATTERN

Practical (Full Marks 25)

1. Calculation of Cost-return from irrigated and rain fed condition per hectare basis/ calculation of the Economics of silkworm rearing: Investment and return/ Sericulture Vs. other agriculture crop (cost return analysis/hectare)
2. Calculation on Central Tendency: Mean, Median, Mode. /Measures of variation: Range, mean deviation, standard deviation, coefficient of variation
3. Chi-square test/ Paired t-test
4. Probability theory/ correlation / regression analysis.
5. Laboratory Note Book
6. Internal Assessment

One external and one internal examiners will conduct the examination

REFERENCES

1. CONCERNED LITERATURES WILL BE COMMUNICATED BY THE FACULTY MEMBERS.
2. KUMARESAN, P. AND SRINIVASA, G. (2005) SERICULTURE EXTENSION MANAGEMENT AND ECONOMICS. CENTRAL SILK BOARD, BANGALORE.

3. MC GRATH, E.H (1986): BASIC MANAGERIAL SKILL FOR ALL.
PRENTICE HAL OF INDIA PVT, LTD., NEW DELHI

4. FUNDAMENTAL OF STATISTICS, A.M GUIN, M.K GUPTA, B. DAS
GUPTA & Co.

VSEM DSCC 10.TH	AGRICUTURAL ENTOMOLOGY	50 HOURS
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UNIT 1: **08 Hours**

Fundamentals of Entomology : History of Entomology in India. Position of the insect in Animal kingdom. Factors for insect's abundance. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda.

UNIT 2: **08 Hours**

Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. General external structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae.

UNIT 3: **08 Hours**

Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptors.

UNIT 4: **08 Hours**

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera, Dictyoptera, Isoptera, Thysanoptera, Hemiptera, Neuroptera, Lepidoptera, Hymenoptera, Coleoptera.

UNIT 5: **10 Hours**

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors–temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance. Concepts of Balance of life in nature, biotic potential and environmental resistance and causes for outbreak of pests in agro-ecosystem.

Categories of insect pests, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests and pest risk analysis. Methods of detection and diagnosis of insect pest. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Important species of pollinator, weed killers and scavengers with their importance.

UNIT 6:

08 Hours

Pests of Host Plants of Silkworm and their Management : Concepts and principles of crop pest management, status of a pest. Biotic potential and environmental resistance. Insect and non-insect pests of Host plants of mulberry and non-mulberry silkworms (Host plants of tasar, eri and muga silkworms namely *Terminalia* spp. Sal, Oak, Castor etc.) sequence of their appearance, duration, intensity, nature and symptoms of attack. Bioecology of pests, Management practices, measures of control. Pesticides residue problems, safety periods to be observed.

THEORY QUESTION PATTERN

For all Core Papers

Theory (Full Marks 75)

Section A (Short questions, ten short questions)

- Students will answer ten questions (each of 2 marks) out of 15 questions.
2 x 10 =20 marks

Section B (Short Notes, 3 short notes)

- Students will write 3 short notes (each of 5 marks) out of 5 short notes.
3 x 5 = 15 marks

Section C (Broad question, 4 questions)

Students will write four questions (each of 10 marks) out of seven questions.

10 x 4 = 40 marks

PRACTICAL SYLLABUS

20 HOURS

1. Methods of collection and preservation of insects including immature stages; External features of Cockroach/Grasshopper/Blister beetle; study of close relatives of insects, phylum Arthropoda. Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae.

04 Hours

2. Dissection of digestive system in insects (Grasshopper, Cockroach); Dissection of male and female reproductive systems in insects (Grasshopper, Cockroach); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

04 Hours

3. Methods of diagnosis and detection of various insect pests, Methods of insect pests measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies.

04 Hours

4. Identification and nature of damage of important insect pests and their management. Insecticides formulations, plant protection equipments, Crop (agro-ecosystem) dynamics of a selected insect pest. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, Awareness campaign at farmers' fields. Identification of major parasitoids and predators commonly being used in biological control.

04 Hours

Note: Students should submit 10 insect specimens representing parasitoids, predator, weed killer and scavengers.

5. Study of various pests of host plants, their diagnostic characters, symptoms of damage and management measures to be adopted. Visit to crop fields to record the incidence of pests noticed and control measures, management practices suggested in each case, in addition to recording nature and symptoms of damage

and estimation of losses. Collection of pests and affected samples of host plants of silkworms.

04 Hours

PRACTICAL QUESTION PATTERN

Practical (Full Marks 25)

1. Demonstration of different parts of the body of insects (Dissected) 4. 5
2. Demonstration of Internal body and all the systems of cockroach
3. Techniques – Mounting, Haemolymph and Haemocyte Staining.
4. Collection and Preservation techniques
5. Identification of different races of silkworm, specimen A, B, C, D and E
6. Laboratory Note Book
7. Internal Assessment

One external and one internal examiners will conduct the examination

REFERENCES

1. GULLAN, P.J. AND CRANSTON, P.S. THE INSECTS: AN OUTLINE OF ENTOMOLOGY. PUBLISHER: BLACKWELL SCIENCE LTD, USA.
2. ROMOSER, W.S. AND STOFFOLANO, JR. J.G. THE SCIENCE OF ENTOMOLOGY. PUBLISHER: MCGRAW-HILL.
3. CHAPMAN, R.F. THE INSECTS: STRUCTURE AND FUNCTION. HARVARD UNIVERSITY PRESS.

VSEM DSCC 11.TH	CROP PHYSIOLOGY	50 HOURS
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UNIT 1:

07 Hours

Fundamentals of Crop Physiology : Introduction: Importance of physiology in agriculture. Plant-water relations: Structure, properties and functions of water; concept of diffusion, osmosis and water potential; Water balance of plants:

Water in soil; Water absorption and translocation in plant; soil-plant atmosphere continuum; Theories explaining water translocation.

UNIT 2:

06 Hours

Transpiration: Significance of Transpiration; transpiration in relation to crop productivity, Stomatal physiology, Concept of water use efficiency.

UNIT 3:

07 Hours

Mineral Nutrition: Importance of plant nutrients; Classification of plant nutrients; Nutrient uptake- Soil, root and microbes interaction, Microbial association for improved uptake of nutrients; Functions of plant nutrients Deficiency and toxicity symptoms of plant nutrients; Hydroponics, aeroponics. Mechanism of ion absorption and translocation. Membrane transporters and carriers.

UNIT 4:

09 Hours

Photosynthesis: Mechanism of carbon fixation by C₃, C₄ and CAM pathway and their significance; Plant responses to elevated CO₂/climate change; Relation of photosynthesis and crop productivity; Starch and sucrose synthesis; Translocation of Assimilates; Source and sink concept; Photorespiration; Factors affecting photosynthesis and productivity; Dry matter partitioning; Harvest index of crops.

UNIT 5:

06 Hours

Respiration: Significance; Respiratory metabolism, Alternative respiration, Factors regulating respiratory rates.

UNIT 6:

08 Hours

Plant Growth and Development: Concept of plant growth and morphogenesis; Growth and yield parameters and their measurements; Hormones and plant growth regulators in modulating crop growth; Physiological importance of Auxins, GA, Cytokinin, ABA, Ethylene, Brassinosteroids and strigolactones; biosynthesis and mode of action of plant hormones; applications of growth regulators in agriculture, horticulture and industry.

UNIT 7:

07 Hours

Photoperiodism and vernalization: Basic concepts and their relevance in crop productivity; Phytochromes and their role. Seed dormancy and viability: Basic concepts, seed germination and seedling vigor.

THEORY QUESTION PATTERN

For all Core Papers

Theory (Full Marks 75)

Section A (Short questions, ten short questions)

- Students will answer ten questions (each of 2 marks) out of 15 questions.
2 x 10 =20 marks

Section B (Short Notes, 3 short notes)

- Students will write 3 short notes (each of 5 marks) out of 5 short notes.
3 x 5 = 15 marks

Section C (Broad question, 4 questions)

Students will write four questions (each of 10 marks) out of seven questions.

10 x 4 = 40 marks

PRACTICAL SYLLABUS

20 HOURS

1.Preparation of standard solutions; Methods of measuring water status in plant tissue; Determination of soil water status; Determination of stomatal frequency and index; Measurement of stomatal conductance and transpiration; **05 Hours**

2.Measurement of water use efficiency at single leaf level; Extraction, separation and quantification of photosynthetic pigments; Measurement of photosynthetic rate; Measurement of growth and yield parameters; **05 Hours**

3.Measurement of respiration rate; Deficiency symptoms of nutrients and their identification; growth hormone bioassay; Seed dormancy and methods to break seed dormancy; Estimation of moisture percentage and moisture retention capacity of mulberry leaf . **05 Hours**

4.Measurement of Seed viability and seedling vigor; effect of moisture stress on seed germination and seedling vigor. Mulberry germplasm and multi-locational trials (field visit) 2.. Study of mitosis in onion root tip/mulberry root tip (Permanent slide Demonstration) **05 Hours**

PRACTICAL QUESTION PATTERN

Practical (Full Marks 25)

1. Determination of stomatal index/frequency.
2. Estimation of moisture percentage and moisture retention capacity of mulberry leaf.
3. Estimation of leaf protein/transpiration rate in mulberry leaf.
4. Study of mitosis in onion root tip/mulberry root tip (Permanent slide Demonstration.
5. Identification of specimen A, B, C, D and E.
6. Laboratory Note Book
7. Internal Assessment

One external and one internal examiners will conduct the examination

REFERENCES

1. GOLDSMITH, M AND WILKINSON, A.S. (1996) MOLECULAR MODEL SYSTEM IN LEPIDOPTERANS. CAMBRIDGE PRESS, LONDON.
2. HIRATSUKA. (1999) SILKWORM BREEDING OXFORD & IBH PUBLISHING CO, PVT. LTD. NEW DELHI. CALCUTTA.
3. MOROHOSHI, S (2000) DEVELOPMENT, AND PHYSIOLOGY OF SILKWORM. OXFORD & IBH PUBLISHING CO, PVT. LTD., NEW DELHI.
4. SREERAMREDDY (ED), G. (1998). SILKWORM BREEDING. IBM PUBLISHERS, NEW DELHI. P a g e 21 | 39
5. STRICKBERGER, M.W. (1996). GENETICS. PRENTICE-HALL OF INDIA, NEW DELHI

VSEM DSCC 12.TH	FORESTRY & ENVIRONMENTAL SCIENCES	50 HOURS
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UNIT 1:

06 Hours

Introduction to Forestry: Introduction–definitions of forest and forestry, branches of forestry, history and education of forestry in India. objectives of

silviculture, forest classification, Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in India.

UNIT 2:

10 Hours

Environmental Studies and Disaster Management : Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, mining, and their effects on forest b) Water resources: Use and over-utilization of surface and ground water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. d) Energy resources: Growing energy needs, use of alternate energy sources. e) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT 3:

06 Hours

Ecosystems: Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT 4:

08 Hours

Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem. Value of biodiversity: consumptive use, productive use, social,

ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT 5:

05 Hours

Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

UNIT 6:

06 Hours

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

UNIT 7:

03 Hours

Human Population and the Environment: population growth, variation among nations, population explosion, Environment and human health: Role of Information Technology in Environment and human health.

UNIT 8:

06 Hours

Disaster Management: Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, avalanches, volcanic eruptions. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, forest fire, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to mitigate natural disaster at national and global levels.

THEORY QUESTION PATTERN

For all Core Papers

Theory (Full Marks 75)

Section A (Short questions, ten short questions)

- Students will answer ten questions (each of 2 marks) out of 15 questions.
2 x 10 =20 marks

Section B (Short Notes, 3 short notes)

- Students will write 3 short notes (each of 5 marks) out of 5 short notes.
3 x 5 = 15 marks

Section C (Broad question, 4 questions)

Students will write four questions (each of 10 marks) out of seven questions.

10 x 4 = 40 marks

PRACTICAL SYLLABUS

20 HOURS

1. Identification of tree-species, seedlings, seed and non-wood timber forest products.

Visits of nearby Botanical Garden/Agroforestry system.

2. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.

3. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community.

4. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area,

5. Temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method)
6. Report on a visit to Bird /Wild life sanctuary/Zoological Garden

PRACTICAL QUESTION PATTERN

Practical (Full Marks 25)

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Weiner diversity index for the same community
3. Temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method) (Any one)
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary.
5. Identification of different common flora and fauna of various ecological habitats with characteristics, specimen A, B, C, D and E
6. Laboratory Note Book
7. Internal Assessment

One external and one internal examiners will conduct the examination

REFERENCES

1. COLINVAUX, P. A. (1993). ECOLOGY. II EDITION. WILEY, JOHN AND SONS, INC.
2. KREBS, C. J. (2001). ECOLOGY. VI EDITION. BENJAMIN CUMMINGS.
3. ODUM, E.P., (2008). FUNDAMENTALS OF ECOLOGY. INDIAN EDITION. BROOKS/COLE
4. ROBERT LEO SMITH ECOLOGY AND FIELD BIOLOGY HARPER AND ROW PUBLISHER
5. RICKLEFS, R.E., (2000). ECOLOGY. V EDITION. CHIRON PRESS.