

B.Sc. (Hons) Agriculture – 2025 Syllabus**First Year – Second Semester**

S. No	Course No	Course Title	Credit Hours
1	AEX 103	Personality Development	2(1+1)
2	ENS 101	Environmental Studies and Disaster Management	3 (2+1)
3	SAC 102	Soil Fertility Management	3 (2+1)
4	AEN 101	Fundamentals of Entomology	3 (2+1)
5	AMP 101	Livestock and Poultry Management	3 (2+1)
6	PAT 101	Fundamentals of Plant Pathology	3 (2+1)
7	AGR 102	Fundamentals of Agronomy	3 (2+1)
8	SEC III	Skill Enhancement course -III	2(0+2)
9	SEC IV	Skill Enhancement course – IV	2(0+2)
10	NSS 101 NCC 101	National Service Scheme I / National Cadet Corps I	1 (0+1)#
11	PED 101	Physical Education, First Aid, Yoga Practice and Meditation (Yoga Practice and Meditation offered in II semester)	1 (0+1)**
Total			25(13+12)
Class Duration: Practical: 2 hours Theory: 1 hour			

AEX 103 Personality Development (1+1)

Theory

Unit I: Personality & Determinants of personality

Personality Definition, Nature of personality, theories of personality and its types. The humanistic approach - Maslow's self-actualization theory, shaping of personality, Determinants of personality, Myers-Briggs Typology Indicator, Locus of control and performance, Type A and Type B Behaviours, personality and Organizational Behaviour.

Unit II: Individual behavior, Perception and Attribution

Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior, Perception and attributes and factors affecting perception, Attribution theory and case studies on Perception and Attribution.

Unit III: Learning & organizational behavior

Learning: Meaning and definition, theories and principles of learning, Learning and organizational behavior, Learning and training, learning feedback. Attitude and values.

Unit IV: Intelligence & its measurements

Intelligence- types of Intelligence, theories of intelligence, measurements of intelligence, factors influencing intelligence, intelligence and Organizational behavior, emotional intelligence.

Unit V: Motivation, Teamwork and group dynamics

Motivation- theories and principles, Teamwork and group dynamics.

Practicals

MBTI personality analysis, Learning Styles and Strategies, Motivational needs, Firo-B, Interpersonal Communication, Teamwork and team building, Group Dynamics, Win-win game, Conflict Management, Leadership styles, Case studies on Personality and Organizational Behavior.

Theory Schedule

1. Personality- Meaning, Definition, Nature of personality, theories of personality - Biological personality, Psychoanalytic, Humanistic, Trait perspective and Behaviourist theories. Personality types – Sheldon, Galen, Pavlov –Extrovert, Introvert and Ambivert.
2. The humanistic approach - Maslow's self-actualization theory. Shaping of personality - stages of shaping - Freud, Erikson, and Piaget's theories.

3. Determinants of personality - Myers-Briggs Typology Indicator -Locus of control and performance, Type A and Type B Behaviours
4. Personality and organizational behavior: Personality-Importance of inherited and acquired characteristics. Organizational behaviour-Meaning and definition. Personality traits in organizational behaviour -OCEAN- (Openness to experience, conscientiousness, extroversion, agreeableness and neuroticism)
5. Foundations of individual behavior – Motivation, Ability, Role perception, Situational factors (MARS) and factors influencing individual behavior -personal factors, environmental factors and organisational factors.
6. Models of individual behavior – Rational and Emotional Model, Behaviouristic and Humanistic Model, Economic and Self-Actualizing Model and Theory X and Theory Y.
- 7.** Perception – meaning, definition, stages and attributes of perception, Perceptual process, factors affecting perception.
8. Fritz Heider Attribution theory, Jones & Davis Correspondent Inference Theory and case studies on Perception and Attribution
- 9. Mid-Semester Examination**
10. Learning- Meaning and definition, theories (Classical and Operant Conditioning Theory) and principles of learning –Learning and Organizational Behaviour - Behaviorism, Cognitivism, Connectivism, Constructivism, and Humanism.
11. Learning and training – meaning, definition, Learning vs training. Learning feedback (Focus on learning, Be timely: Be constructive: Encourage action, Provide further help, Focus on learning goals, Provide prompt feedback)
12. Attitude and values - meaning, definition, importance– types of values - Attitude Vs Values
13. Intelligence- meaning, definition, types of Intelligence - Abstract, Concrete and Social Intelligence, theories of intelligence (Spearman's Two factor Theory of Intelligence, Thurstone's Theory of Intelligence and Gardner's Theory of Multiple Intelligences)
14. Measurement of intelligence - Binet Test, Wechsler Scales. Factors influencing intelligence.
15. Intelligence and Organizational behavior - Key aspects of intelligence in organization, emotional intelligence –Pillars of emotional intelligence (self-awareness, self-regulation, motivation, empathy and social skills)

16. Motivation theories - Maslow's needs hierarchy, Alderfer's ERG theory, McClelland's achievement motivation and Herzberg's two-factor theory and principles of motivation.
17. Teamwork and Group dynamics – Meaning, Definition, team building, and group dynamics – Meaning, Definition and key elements of group dynamics (roles, norms, relationships, and communication).

Practical Schedule

1. Exercise on MBTI personality analysis
2. Assessing the Learning Styles through Barsch and Kolb Inventories
3. Exercise on applying Learning Strategies
4. Assessing the Motivational needs in an Organization
5. Exercise on assessing motivation using online tools
6. Assessing individual's interpersonal needs- Firo-B (Fundamental Interpersonal Relations Orientation-Behavior)
7. Exercise on Effective Interpersonal Communication in an organization
8. Exercise on Teamwork
9. Exercise on Team building
10. Exercise on Group Dynamics
11. Exercise on Win-win game
12. Exercise on Conflict Management
13. Assessing the Leadership styles and its significance in Organization
14. Assessing the Emotional Intelligence
15. Case studies on Personality and its influence in Organization
16. Case studies on Organizational Behavior

17.Final Practical Examination

References

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge(2014), Organizational Behavior 16th Edition: Prentice Hall.

3. Andrews, Sudhir. 1988. How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGraw-Hill.
4. Heller, Robert. 2002. Effective Leadership. Essential Manager series. Dk Publishing.
5. Hindle, Tim. 2003. Reducing Stress. Essential Manager series. Dk Publishing.
6. Kumar, Pravesh. 2005. All about Self- Motivation. New Delhi. Goodwill Publishing House
- Lucas, Stephen. 2001. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.
7. Mile, D.J. 2004. Power of Positive Thinking. Delhi. Rohan Book Company.
8. Shaffer, D. R. 2009. Social and Personality Development (6th Edition). Belmont, CA: Wadsworth
9. Smith, B. 2004. Body Language. Delhi: Rohan Book Company.

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1. https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf
2. <https://courses.lumenlearning.com/waymaker-psychology/chapter/measures-of-intelligence/>
3. <https://study.com/academy/lesson/methods-of-measuring-intelligence-interpreting-an-iq-scores-score-range.html>
4. <https://www.scribd.com/document/623426712/Chapter-3-Attitude-and-Motivation>
5. <https://opentext.wsu.edu/psych105/chapter/10-5-learning-approaches-to-personality>

ENS 101 Environmental Studies and Disaster Management (2+1)

Theory

Unit I: Introduction to Environment

Environmental studies - Definition, scope and importance - Multidisciplinary nature of environmental studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere Natural Resources Classification - Forest resources, Water resources, Mineral resources, Food resources. Energy resources. Land resources. Soil resources.

Unit II: Ecosystems

Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem., Types of ecosystems, Biodiversity and its conservation - Introduction, definition, types. Biogeographical classification of India. Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity

Unit III : 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 g. light pollution - Solid Waste Management Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, effects and control measures of urban and industrial wastes.

Unit IV: Social issues and the Environment

Urban problems related to energy. Water conservation, rainwater harvesting, watershed management. Environmental ethics Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act, EIA, Environmental Auditing, International conventions Human Population and the Environment - Environment and human health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health.

Unit V: Disaster management

Disaster definition - Types - Natural Disasters - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Man Made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media

in disaster management. Central, state, district and local administration in disaster control; Armed forces in disaster response; Police and other organizations in disaster management.

Practicals

Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain. Energy: Biogas production from organic waste. Visit to windmill / hydro power / solar power generation units. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and unpolluted system. Visit to local polluted site- Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS & mitigation measures. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of E. coli in water sample. Assessment of Suspended Particulate Matter (SPM). Study of simple ecosystem – Visit to pond/river/hills. Visit to areas affected by natural disaster

Theory Schedule

1. Introduction to Environmental studies - Definition, scope and importance - Multidisciplinary nature of environmental studies
2. Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere
3. Atmosphere - Different layers of atmosphere
4. Natural Resources: Classification - Forest resources, Water resources, Mineral resources, Food resources
5. Energy resources – Classification - Renewable and Non- Renewable, Land resources, Soil resources.
6. Ecosystems – Ecology – Types of Ecology - Concept of an ecosystem - Structure and function of an ecosystem
7. Dynamics of Ecosystem – Energy, Primary and secondary production, Energy flow in the ecosystem, Food chain, Food web
8. Trophic level, Ecological pyramids, Biogeochemical cycles, Succession and its types,
9. Types of ecosystems – Aquatic and Terrestrial Ecosystem
10. Biodiversity and its conservation: Introduction, definition, types. Bio-geographical classification of India.
11. Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity – *In-situ* and *Ex-situ*.
12. Pollution and Pollutants: Definition, Air pollution, Criteria air pollutants: Cause, effects and control measures

13. Cause, effects and control measures: Water pollution, Marine pollution, Thermal pollution
14. Cause, effects and control measures: Soil pollution, Noise pollution, light pollution
15. Solid Waste Management: Classification of solid wastes and management methods, Incineration, Pyrolysis, Biogas production,
16. Causes, effects and control measures of urban and industrial wastes - Composting
17. Social issues and the Environment: Urban problems related to energy. Water conservation, rain water harvesting, watershed management

18. Mid-Semester Examination

19. Environmental ethics: Issues and possible solutions, climate change, global warming,
20. Acid rain, ozone layer depletion, nuclear accidents and holocaust.
21. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act,
22. EIA and Environmental Auditing
23. International conventions
24. Human Population and the Environment: Environment and human health: Human Rights, Value Education. Women and Child Welfare.
25. Role of Information Technology in Environment and human health.
26. Disaster management - Disaster definition - Types - Natural Disasters - Floods, Cyclone,
27. Earthquakes, landslides, Avalanches, volcanic eruptions
28. Drought, Heat and cold waves
29. Man Made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire,
30. Road accidents, rail accidents, air accidents, sea accidents.
31. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements;
32. Role of NGOs, community-based organizations and media in disaster management.
33. Central, state, district and local administration in disaster control
34. Armed forces in disaster response; Police and other organizations in disaster management.

Practicals

1. Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain.

2. Energy: Biogas production from organic wastes
3. Visit to wind mill / hydro power / solar power generation units.
4. Biodiversity assessment
5. Floral and faunal diversity assessment in polluted and unpolluted system.
6. Visit to local polluted site-Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds
7. Environmental sampling and preservation
8. Water quality analysis: pH, EC and TDS and mitigation measures
9. Estimation of Acidity, Alkalinity in water samples
10. Estimation of water hardness in water samples
11. Estimation of DO and BOD in water samples
12. Estimation of COD in water samples
13. Enumeration of *E. coli* in water sample
14. Assessment of Suspended Particulate Matter (SPM)
15. Study of simple ecosystem – Visit to pond/river/hills
16. Visit to areas affected by natural disaster / PCB lab / Fire service
17. **Final Practical Examination**

References

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2. Dhar Chakrabarti. P.G. 2011.Disaster Management - India's risk management policy Frameworks and Key Challenges. Published by Centre for Social Markets (India), Bangalore.36 pp.
3. Sharma, P.D. 2009, Ecology and Environment, Rastogi Publications, Meerut, India
4. Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage Learning Publication, Belmont, USA.
5. Erach Barucha, Text book for Environmental Studies. University Grants Commission, New Delhi

SAC 102 Soil Fertility Management (2+1)

Theory

Unit I: Soil Fertility and Plant Nutrients

History of soil fertility and plant nutrition. Criteria of nutrient essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of macro, secondary and micronutrients.

Unit II: Soil Fertility Evaluation

Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of Nutrients. Soil and plant analysis, rapid plant tissue tests, Indicator plants.

Unit III: Fertilizers & Fertilizer Recommendation approaches

Introduction and importance of fertilizers and manures. Fertilizer Recommendation approaches -STCR / RTNM / IPNS-Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major, secondary & micronutrients fertilizers.

Unit IV: Fertilizers & Manures

Complex fertilizers, Customized fertilizers, Nano fertilizers, Soil amendments Preparation and properties of major manures (FYM, compost, vermicompost, green manuring, oilcakes). Fertilizer Storage, Fertilizer Control Order.

Unit V: Nutrient use efficiency & Carbon Storage

Methods of fertilizer recommendation to crops- Fertilisation for rainfed and irrigated crops- Nutrient use efficiency (NUE). Factors influencing NUE. Carbon sequestration and Carbon Trading

Practicals

Introduction of analytical instruments and their principles, calibration and applications of colorimetry, spectroscopy (UV-Vis Spectrophotometer Atomic Absorption Spectrophotometer) and flame photometry; Estimation of soil organic carbon and alkaline hydrolysable N in soils; Estimation of soil extractable P in soils; Estimation of exchangeable K in soils; Estimation of exchangeable Ca and Mg in soils; Estimation of soil extractable S in soils; Estimation of DTPA extractable Zn, Cu, Fe, Mn in soils. Estimation of Hot water soluble boron soils. Estimation of N in plants; Estimation of P in plants; Estimation of K in plants; Estimation of S in plants; Fertilizer calculations: Soil test based fertilizer prescription-STCR and M & B

Theory Schedule

1. History of soil fertility, productivity plant nutrition and criteria of nutrient essentiality.
2. Functions, deficiency and toxicity symptoms of N, P and K.
3. Functions, deficiency and toxicity symptoms of Secondary, Micronutrient and beneficial elements
4. Mechanisms of nutrient transport to plants
5. Factors affecting nutrient availability to plants
6. Chemistry of Major nutrients: Sources, forms, mobility, transformation, fixation, losses and availability
7. Chemistry of Secondary nutrients and Micronutrients: Sources, forms, mobility, transformation, fixation, losses and availability
8. Soil fertility evaluation: concepts - Liebig's Law, Mitscherlich's law and Bray's nutrient mobility concept. Approaches - Deficiency symptoms, tissue analysis, biological tests and chemical tests.
9. Techniques/ methods of soil fertility evaluation: Crop logging, critical level, DRIS, Isotopic nutrient availability techniques.
10. Soil testing- soil and plant analysis, rapid plant tissue tests, Indicator plants.
11. Fertilizer recommendation approaches- M & B,STCR,STCR-IPNS,RTNM
12. Integrated nutrient management-definition, concepts, importance; PME & LTFE.
13. Organic manures-Importance, Definition, classification, properties and sources
14. Preparation and properties : bulky and concentrated manures - composting techniques- Aerobic and anaerobic (Bangalore & Coimbatore method)
15. Preparation and properties of manures: Enriched FYM, vermicompost, green manuring, oilcakes.
16. Fertilizers- Definition, classification of major, secondary and micronutrients fertilizers.
17. N fertilizers: Properties and reactions in soil - Urea, ammonium sulphate, ammonium nitrate, CAN, properties
18. **Mid semester Examination**
19. P fertilizers- Properties and reactions in soil- Rock phosphate, bone meal, basic slag, single super phosphate, diammonium phosphate, triple super phosphate.
20. K fertilizers: Properties and reactions in soil - MOP and SOP
21. Secondary nutrients and micronutrient fertilizers: Properties and reactions in soil
22. Complex fertilizers- definition, manufacture of ammonium phosphate, nitro phosphate and N,P,K complexes.
23. Mixed fertilizers-definition, preparation and compatibility.

24. Customized/designer fertilizers, water soluble, liquid fertilizers
25. Nano fertilizers : Importance, classification, properties and reactions in soil
26. Soil amendments : Importance, classification, properties and reactions in soil
27. Fertilizer Storage and Fertilizer Control Order
28. Methods of fertilizer recommendation to crops- Soil and foliar application.
29. Fertigation - Definition - Types of fertigation and scheduling
30. Fertilisation for rainfed and irrigated crops- Seed coating, pelletization, seedling dipping
- Nutriseed pack
31. Nutrient use efficiency - N fertilizers -Significance and enhancement techniques - Slow-release, inhibitors, coated fertilisers
32. Nutrient use efficiency - P, K and micronutrients fertilisers- Significance and enhancement techniques – enriched, customised, fortified, coated fertilisers
33. Factors influencing nutrient use efficiency (NUE)
34. Carbon sequestration and Carbon Trading

Practical Schedule

1. Introduction of analytical instruments and their principles, calibration and applications (Colorimetry, UV-Vis Spectrophotometer)
2. Introduction of analytical instruments and their principles, calibration and applications of Spectroscopy - Atomic Absorption Spectrophotometer
3. Introduction of analytical instruments and their principles, calibration and applications of flame photometry-Flame photometer
4. Estimation of soil organic carbon
5. Estimation of alkaline hydrolysable N in soil
6. Estimation of soil extractable P in soil (Bray and Olsen methods)
7. Estimation of exchangeable K and soil extractable S in soils
8. Estimation of exchangeable Ca and Mg and in soil
9. Estimation of DTPA extractable Zn, Cu, Fe, Mn in soil
10. Estimation of Hot water soluble boron in soil
11. Preparation and digestion of Plant
12. Estimation of Nitrogen in plants
13. Estimation of Phosphorus and Potassium in plants
14. Estimation of Sulphur in plants

15. Estimation of Micronutrients in plant
16. Fertilizer calculations : Soil test based fertilizer prescription-STCR and M&B

17.Final Practical Examination

References

1. Soil Fertility and Nutrient Management (2017)– By S. S. Singh, Kalyani Publishers
2. Introductory Soil Science (2022) – By Dilip Kumar Das, Kalyani Publishers
3. Soil Fertility and Fertilizers (2016) – By Samuel L. Tisdale, Werner L. Nelson and
4. James D. Beaton, Macmillan Publishing Company, New York
5. The Nature and Properties of Soils (1998) By Harry O. Buckman and Nyle C. Brady

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6. www.uoa.edu.er/academics/graduate/. . . /courses.html -
7. www.fao.org/wairdocs/ilri/x5546e/x5546e08.htm
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9. www.uoa.edu.er/academics/graduate/. . . /courses.html -
10. www.ncpahindia.com/articles/article17.pdf-Similar
11. www.energy.ca.gov/process/agriculture/ag_pubs/fertigation.pdf -
12. www.soilandhealth.org/. . . /010117attrasoilmanual/010117attra.html

AEN 101 Fundamentals of Entomology (2+1)

Theory

Unit I: History of Entomology, Insect Morphology

History of Entomology in India; Causes for dominance of Insecta in Animal kingdom; Classification of phylum Arthropoda upto classes; Relationship of class Insecta with other classes of Arthropods; Morphology: Structure and functions of insect cuticle and moulting, Body segmentation, Structure of head, thorax and abdomen, Structure and modifications of insect antennae, mouth parts, legs, wings and wing coupling apparatus, male and female genital organs; Metamorphosis and diapause in insects; Types of larvae and pupae

Unit II : Insect Anatomy & Physiology

Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine & Exocrine) and reproductive system; Types of reproduction; Major sensory organs; Tropism and communication.

Unit III: Insect Systematics

Insect Taxonomy –importance, binomial nomenclature, Definitions of Biotype, Sub-species, Species, Genus, Family and Order; Classification of class Insecta upto Orders; Orders and families of agricultural important insects like Apterygota, Odonata, Dictyoptera, Orthoptera, Hemiptera, Isoptera, Thysanoptera, Siphonaptera, Siphunculata, Mallophaga, Lepidoptera, Coleoptera, Diptera, Hymenoptera, and Neuroptera.

Unit IV: Insect Ecology, Principles and components of pest management I

Insect Ecology - balance of life in nature – reproductive potential and environmental resistance; Categories of pests; Population dynamics- Effect of abiotic factors and biotic factors - Interspecific and intraspecific relationship; pest outbreak – factors governing pest outbreak; pest monitoring, surveillance - sampling techniques - Roving and fixed plot survey, Pest forecasting – objectives, digital tools for monitoring; Economic Threshold Level & Economic Injury Level; Integrated Pest Management –concept, scope and limitations, Cultural, physical, mechanical, ecological engineering methods and host plant resistance in pest management; Legal methods –pest introductions – quarantine – phytosanitary certificate; Biological control - Parasitoids, predators, microbial agents and biopesticides in pest management

Unit V: Principles and components of pest management II

Semiochemicals in pest management; Sterile insect technique; insect growth regulators; antifeedants and repellents; Botanicals; Biotechnology in pest management; Chemical control

- Classification of insecticides, Mode of action, Ideal qualities of an insecticide, Pesticide compatibility, safe handling; Pesticide poisoning – antidotes; impact of pesticides on agroecosystems; Insecticides Act 1968 – insecticide residues and waiting periods, insecticide resistance management

Practical

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/cockroach; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus; Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper/cockroach); Study of characters of orders Apterygota, Odonata, Dictyoptera, Orthoptera, Hemiptera, Isoptera, Thysanoptera, Siphonaptera, Siphunculata, Mallophaga, Diptera, Hymenoptera, Neuroptera, Coleoptera and Lepidoptera and their families of agricultural importance; IPM Components: mechanical, physical and behavioural approaches in pest management; predators, parasitoids, their mass culture; entomopathogens and their mass production; Insecticides and their formulations; Pesticide application techniques including drone spraying; Preparation of spray fluids.

Theory Schedule

1. History of Entomology in India; Position of insects in the animal kingdom; Relationship of class Insecta with other classes of Arthropods; Factors responsible for dominance
2. Insect body wall - its structure and function; cuticular appendages; Moulting process in insects
3. Structure of insect head, thorax and abdomen and their appendages
4. Types of metamorphosis and variations in immature stages of insects
5. Structure of sense organs - photoreceptors, chemoreceptors & mechanoreceptors; Tropism and Biocommunication in insects
6. Anatomy and physiology of digestive system of insects
7. Anatomy and physiology of excretory systems of insects
8. Anatomy and physiology of respiratory system of insects
9. Anatomy and physiology of circulatory system of insects
10. Anatomy and physiology of reproductive system and Types of reproduction in insects
11. Anatomy and physiology of nervous system of insects, axonic and synaptic impulse transmissions in insects
12. Exocrine and endocrine glands and their function in insect physiology

13. Systematics - principles and procedures of classification and binomial nomenclature of insects, biotypes, sub species, species, Genus, Family and Order
14. Distinguishing characters of insect orders- Apterygota, Odonata - Anisoptera & Zygoptera, Dictyoptera - Blattodea & Mantodea, Isoptera
15. Distinguishing characters of insect orders- Orthoptera - Ensifera (Tettigonidae, Gryllidae and Gryllotalpidae); Caelifera (Acrididae), Thysanoptera (Thripidae), Siphonaptera, Siphunculata and Mallophaga
16. Distinguishing characters of insect orders — Hemiptera — Homoptera (Delphacidae, Cercopidae, Cicadidae, Cicadellidae, Psyllidae, Aleyrodidae, Aphididae, Kerridae, Pseudococcidae, Coccidae and Diaspididae)
17. Distinguishing characters of insect orders — Hemiptera - Heteroptera (Cimicidae, Tingidae, Reduviidae, Miridae, Lygaeidae, Pyrrhocoridae, Coreidae, Pentatomidae, Lophopidae, Alydidae, Podopidae, Gerridae, Belastomatidae, Nepidae)
18. **Mid Semester Examination**
19. Distinguishing characters of insect orders Diptera- Nematocera (Psychodidae, Culicidae and Cecidomyiidae), Brachycera (Tabanidae, Asilidae), Cyclorhapha (Syrphidae, Drosophilidae, Muscidae, Calliphoridae, Tachinidae, Hippoboscidae, Agromyzidae and Tephritidae)
20. Distinguishing characters of insect orders Hymenoptera - Symphyta (Tenthredinidae) Apocrita (Ichneumonidae, Braconidae, Evaniidae, Agaonidae, Chalcididae, Encyrtidae, Eulophidae, Trichogrammatidae, Bethyidae, Formicidae, Vespidae, Sphecidae, Megachilidae, Xylocopidae and Apidae); Neuroptera - (Mantispidae, Chrysopidae, Myrmeleontidae and Ascalaphidae).
21. Distinguishing characters of insect orders Coleoptera - Adephaga (Carabidae, Cicindellidae, Dytiscidae) Polyphaga (Hydrophilidae, Staphylinidae, Scarabaeidae, Dynastidae, Melolonthidae, Cetonidae, Buprestidae, Elateridae, Lampyridae, Dermestidae, Anobiidae, Bostrychidae, Coccinellidae, Tenebrionidae, Meloidae, Cerambycidae, Bruchidae, Chrysomelidae, Apionidae and Curculionidae)
22. Distinguishing characters of insect orders Lepidoptera - Butterfly families (Nymphalidae, Lycaenidae, Pieridae, Papilionidae and Hesperidae), Moth families (Psychidae, Gelechiidae, Cochliidae, Pyralidae, Crambidae, Pterophoridae, Geometridae, Bombycidae, Saturniidae, Sphingidae, Arctiidae, Lymantriidae, Noctuidae)

23. Insect ecology – definition – balance of life in nature – reproductive potential and environmental resistance - Population dynamics – role of biotic and abiotic factors – competition – Interspecific and intraspecific relationship
24. Pests, categories of pest; Causes for outbreak of pests and losses by pests; Pest monitoring – pest surveillance - sampling techniques - Roving and fixed plot survey, Pest forecasting – objectives, digital tools for monitoring, General Equilibrium Position, Economic Threshold Level and Economic Injury Level
25. Integrated Pest Management –Concept, scope and limitations; Components of pest management - Cultural methods; Ecological Engineering in pest management; Physical methods- use of heat, moisture, light, electromagnetic energy and sound energy; Mechanical methods- mechanical destruction and exclusion
26. Host plant resistance- types and mechanisms of resistance and role of host plant resistance in pest management; Legal methods- pest introductions – quarantine – phytosanitary certificate
27. Biological control- predators & parasitoids - role in pest management; classical biological control
28. Microbial control- viruses, bacteria, fungi, protozoa and nematodes infesting insects; biopesticides and their role in pest management
29. Semiochemicals – Interspecific – allomone, kairomone, synomone and apneumone – Intraspecific – pheromone, sex pheromone, alarm and trail marking pheromone-use in IPM; Sterile male insect release methods of pest management- methods of sterilization
30. Insect growth regulators- Moulting inhibitors – Juvenile Hormone mimics – mode of action; Insect antifeedants and repellents;
31. Botanicals; Biotechnological approaches in pest management–bio safety of transgenic plants
32. Chemical control - toxicity parameters, Classification of insecticides, Ideal qualities of an insecticide, Pesticide compatibility, safe handling
33. Mode of action of organophosphates, carbamates, synthetic pyrethroids, neonicotinoids, diamides, avermectins and new molecules
34. Pesticide poisoning – antidotes; impact of pesticides on agroecosystems; Insecticides Act 1968 – insecticide residues and waiting periods, insecticide resistance management

Practical Schedule

1. Observations on external features of grasshopper / blister beetle/ Cockroach;
2. Methods of insect collection, preservation, display and storage
3. Types of insect head and its appendages- Types of Mouth parts and antenna
4. Structure of thorax and their appendages —modifications in insect legs and wings, wing coupling
5. Structure of abdomen and their appendages; male and female genital organs; types of immature stages of insects
6. Study of digestive systems in insects (grasshopper/ cockroach)
7. Observing the characters of Apterygota, Exopterygota – Odonata- Anisoptera & Zygoptera, Dictyoptera - Blattodea & Mantodea, Isoptera, Orthoptera (Ensifera - Tettigonidae, Gryllidae and Gryllotalpidae; Caelifera - Acrididae), Thysanoptera, Siphonaptera, Siphunculata, Mallophaga
8. Observing the characters of Exopterygota — Hemiptera — Homoptera (Delphacidae, Cercopidae, Cicadidae, Cicadellidae, Psyllidae, Aleyrodidae, Aphididae, Kerriidae, Pseudococcidae, Coccidae and Diaspididae), Heteroptera (Cimicidae, Tingidae, Reduviidae, Miridae, Lygaeidae, Pyrrhocoridae, Coreidae, Pentatomidae, Gerridae, Belastomatidae, Nepidae)
9. Observing the characters of orders Diptera- Nematocera (Psychodidae, Culicidae and Cecidomyiidae), Brachycera (Tabanidae, Asilidae), Cyclorhapha (Syrphidae, Drosophilidae, Muscidae, Calliphoridae, Tachinidae, Hippoboscidae, Agromyzidae and Tephritidae)
10. Observing the characters of Hymenoptera & Neuroptera -Symphyta (Tenthredinidae) Apocrita (Ichneumonidae, Braconidae, Evanidae, Agaonidae, Chalcididae, Encyrtidae, Eulophidae, Trichogrammatidae, Bethyidae, Formicidae, Vespidae, Sphecidae, Megachilidae, Xylocopidae and Apidae) Neuroptera (Mantispidae, Chrysopidae, Myrmeleontidae and Ascalaphidae)
11. Observing the characters of Coleoptera - Adephaga (Carabidae, Cicindellidae, Dytiscidae) Polyphaga (Hydrophilidae, Staphylinidae, Scarabaeidae, Dynastidae, Melolonthidae, Cetonidae, Buprestidae, Elateridae, Lampyridae, Dermestidae, Anobiidae, Bostrychidae, Coccinellidae, Tenebrionidae, Meloidae, Cerambycidae, Bruchidae, Chrysomelidae, Apionidae and Curculionidae)
12. Observing the characters of Lepidoptera - Butterfly families (Nymphalidae,

Lycaenidae, Pieridae, Papilionidae and Hesperidae), Moth families (Psychidae, Gelechiidae, Cochliidae, Pyralidae, Crambidae, Pterophoridae, Geometridae, Bombycidae, Saturniidae, Sphingidae, Arctiidae, Lymantriidae, Noctuidae)

13. Mechanical, physical and behavioral approaches in pest management
14. Identification and mass culturing of different types of predators and parasitoids
15. Mass production of entomopathogens; Field application of biopesticides
16. Pesticide formulations; Preparation of spray fluids; Pesticide application techniques including drone spraying

17.Final Practical examination

Assignment

1. Collection and submission of 50 insects
2. Preparation and submission of one riker mount

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3. Chapman, R.F. 1998. *The Insects: Structure and Function*. Fourth Edition. Cambridge University Press. 770p. {ISBN 0 521 78732 7}
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e- Resources

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2. www.zin.ru/animalia
3. <https://courses.cit.cornell.edu/ent201/content/anatomy2.pdf>
4. www.insectsexplained.com/03external.htm
5. www.earthlife.net/insects/anatomy.html
6. www.insectidentification.org/orders_insect.asp
7. <http://www.ncipm.org.in/recent-publications.html>

AMP 101 Livestock and Poultry Management (2+1)

Theory

Unit I: Introduction to Livestock Management

Significance of Livestock and Poultry in Indian Economy – Livestock and Poultry census – Different livestock development programs of Government of India and Tamil Nadu- Various systems of livestock production-extensive – semi intensive - intensive- mixed- Integrated and specialized farms.

Unit II: Dairy Cattle Management

Important White and Black cattle breeds – Classification and Breed Characteristics of indigenous and exotic White and Black cattle breeds– Breeding - Cross breeding- Upgrading - Economic traits of cattle –Culling - Estrus Cycle – Artificial Insemination – Introduction to Embryo transfer – Housing – Space requirement calf and adult stock – System and types of housing - Care and Management of calf, heifer, pregnant, lactating, dry and working animals – Digestion in ruminants and non ruminants- Nutrition – Ration – Balanced Ration - Characteristics of ration and classification of feed and fodder –Total Mixed Ration –Proximate principles of feed - Nutrients and their functions - Feed ingredients ration for livestock and poultry - Composition of concentrate mixture of young and adult stock-age wise feed and fodder requirement-Importance of green fodder- Milking methods - Clean milk production – Factors affecting milk yield and composition – Disease classification - Common diseases of cattle – symptoms - preventing and control measures.

Unit III: Sheep and Goat Management

Breeds - Sheep and goat classification - Economic traits - System of rearing - Housing Management – Floor space requirement - Care and Management of young and adult stock – Nutrition – Feed and fodders of Small ruminants – Flushing - Common diseases – prevention and control.

Unit IV: Management of Swine

Classification of breeds – Economic traits - Housing - Nutrition – creep feeding - Care and Management of Adult and Young Stock - Common disease- prevention and control.

Unit V: Poultry Management

Classification of breeds - Commercial Strains of broilers and layers – Housing – brooding – deep litter and cage system – care and Management of broilers and layers -Nutrition of Chick, grower, Layer and broiler – Incubation and Hatching of Eggs - Common Diseases - Control and prevention.

Practical

Study of external parts of Livestock - Identification of livestock and poultry-Tattooing-ear tags-

wing and leg bands-Common restraining methods-Disbudding (or) Dehorning-Different methods of castration-Dentition-Study of type design of animal and poultry houses-Selection of dairy cow and work bullock-Determination of specific gravity, fat percentage and total solids of milk- Milking methods, clean milk production - Identification of feeds and fodder- Computation of rations for livestock. Formulation of concentrate mixtures- Economics Dairy, Goat and Swine farming - Study of external parts of Fowl - Preparation of Brooder House - Brooder management-Identification of layer and non layer- Debeaking, delousing and deworming of poultry-Vaccination schedule for broiler and layer-Dressing of broiler chicken - Economics of Broiler and Layer Farming - Visit to a modern Dairy and commercial layer and broiler farms - Demonstration of incubator and setter.

Theory schedule

1. Significance of livestock and poultry in Indian economy-livestock and poultry census. Different livestock development programmes of Government of India and Tamil Nadu - www.indiastat.com, Livestock census 2019, Dairying in Tamil Nadu 2019 by NDDB
2. Various systems of livestock production-extensive – semi intensive, intensive- mixed-integrated and specialized farms.
3. Definition of breed-classification of indigenous white and black cattle-breed characteristics of Tamil Nadu cattle breeds and Indian breeds -Sindhi, Gir and Sahiwal.
4. Breed-characteristics of exotic cattle -Jersey and Holstein Friesian – Indian Buffaloes-Murrah, Surti and Toda.
5. Breeding-cross breeding-upgrading-economic traits of cattle-culling importance and methods
6. Estrous cycle – signs of estrous - artificial insemination-merits and demerits-Principles and outline of embryo transfer
7. Housing management-farm site selection and floor space requirement for calves, heifer, milch animal and work bullocks.
8. Systems of housing-single row system-double row system- head to head and tail to tail-merits and demerits - Type design of house.
9. Care and management of new born calf and heifers; pregnant animal and lactating animals and dry cows and work bullock
10. Digestion in ruminants and non ruminants.
11. Nutrition-definition-ration-balanced ration-desirable characteristics of a ration. Classification of feed stuffs-concentrate and roughage-comparison, Total Mixed Ration
12. Proximate principles of feed - Nutrients and their functions - Feed ingredients ration for livestock and poultry

13. Composition of concentrate mixture of young and adult stock-age wise feed and fodder requirement-Importance of green fodder
14. Milking methods-clean milk production-factors affecting milk yield and composition
15. Diseases-classification-viral, bacterial and metabolic-general control and preventive measures.
16. Viral diseases-foot and mouth disease; Bacterial diseases - anthrax, hemorrhagic septicemia- black quarter; Metabolic- tympanites, acidosis, ketosis and milk fever
17. Sheep and goat farming-classification of breeds of Indian and exotic origin – economic traits.

18. Mid semester examination

19. Systems of rearing-housing management - type design- floor space requirement for adult and young stock.
20. Care and management of ram, ewe and lamb-nutrition- feeds and fodder for small ruminants.
21. Care and management of buck, doe and kid- nutrition- flushing.
22. Common ailments of sheep and goat-Sheep Pox, FMD, Blue Tongue, PPR, Enterotoxaemia, Ecto and endo parasites.
23. Swine husbandry –Common breeds of exotic origin-Large White Yorkshire, Landrace and Duroc - economic traits- housing of Swine.
24. Care and management of sow, boar and piglets – Nutrition- creep feeding.
25. Disease - prevention and control of swine diseases – Hog Cholera, Foot and Mouth Disease, Ecto and Endo parasites.
26. Classification of breeds - commercial strains of layer and broiler.
27. Care and management of Chicks-brooder management.
28. Systems of housing- deep litter and cage system- floor space requirement-common litter material-litter management-merits and demerits.
29. Care and management of Grower and Layers- vaccination schedule.
30. Care and management of broilers-vaccination schedule.
31. Incubation and hatching of eggs.
32. Nutrition-feed formulation-composition of chick, grower, layer feeds; broiler- starter and Finisher mash-Feed Conversion Ratio /dozen egg or kg of meat production.
33. Classification of disease –viral – bacterial - protozoan- causative organisms, symptoms and prevention – viral diseases- Ranikhet – IBD-avian flu
34. Bacterial disease-E.coli-coryza-salmonellosis-protozoan-coccidiosis-causative organism, symptoms and preventive measures. Management of dead birds and manure

Practical Schedule

1. Study of external parts of livestock
2. Identification of livestock and poultry
3. Common restraining methods of livestock
4. Disbudding, Dehorning, Castration and Dentition of livestock
5. Study of type design of animal and poultry houses
6. Selection of dairy cow and work bullock
7. Determination of specific gravity, fat %, total solids and solids not fat
8. Milking methods and clean milk production
9. Identification of feed & fodder
10. Computation of rations for livestock and formulation of concentrate mixtures
11. Economics of dairy, goat and swine Farming
12. Study of external parts of fowl. Preparation of brooder house and Identification of layer and non- layer
13. Debeaking, delousing, deworming of poultry Vaccination schedule for broiler and layer
14. Demonstration of dressing of broiler. Economics of layer and broiler farming
15. Visit to a modern dairy and commercial layer and broiler farms
16. Demonstration of incubator and setter

17. Final Practical Examination

Reference

1. ICAR (2002) Hand of Animal Husbandry, ICAR, New Delhi.
2. Livestock production – N.S.R. Shastri
3. Livestock management – CA Gopalakrishnan

E- Reference

1. <http://www.elearnvet.net/>
2. http://agridr.in/expert_system/cattlebuffalo/Breeding%20management%20of%20cattle%20and%20buffaloes-2.html

PAT 101 Fundamentals of Plant Pathology (2 + 1)

Unit I: Plant Pathogenic organisms

Plant Pathology : definition, history – Pathogens : fungi, bacteria, virus, viroid, phytoplasma, Fastidious vascular bacteria, spiroplasma , algae and phanerogamic parasites – Koch's postulates - Types of parasitism - General characters of fungi - Pathogenesis- Role of enzymes and toxins in plant disease development – survival and spread of plant pathogens .

Unit II: Fungal taxonomy based on Kirk *et al.*, (2008)

Classification of Kingdom – Protozoa - important taxonomic characters and Symptoms and life cycle of *Plasmodiophora brassicae* - Classification of Kingdom –Chromista- General characters - Classification of Oomycetes .Symptoms and life cycle of *Pythium*, *Phytophthora Sclerospora*, *Perenospora*, *Plasmopara* and *Albugo* -Classification of Kingdom fungi – Classification of Phylum Chytridiomycota and Zygomycota - important characters, symptoms and life cycles of *Synchytrium* and *Rhizopus*. Classification of Phylum – Ascomycota- important characters. Symptoms and life cycles of *Taphrina*, *Aspergillus*, *Penicillium*, *Capnodium*, *Erysiphe*, *Leveillula*, *Phyllactinia*, *Venturia*, *Helminthosporium*, *Alternaria*, *Cercospora*, *Pyricularia* , *Claviceps*, *Ustilago*, *Fusarium*, *Verticillium*, *Colletotrichum*, *Pestalotia*, *Macrophomina* and *Botryodiplodia*.

Classification and general characters of Phylum- Basidiomycota- Symptoms and life cycles of *Puccinia* ,*Uromyces*, *Hemileia*, *Ustilago*, *Sporisorium*, *Urocystis* and *Tilletia*. Important taxonomic characters of *Ganoderma*, *Agaricus*, *Pleurotus* and *Calocybe*. Symptoms and important characters of *Athelium*, *Rhizoctonia* and *Exobasidium*.

Unit III: Bacteria, *Candidatus* phytoplasma, virus, viroid, algal and phanerogamic parasites

Classification, general characteristics and symptoms of bacterial diseases, mode of entry and spread - General characteristics and symptoms of viral, viroid and phytoplasma diseases - General characters of algal parasite *Cephaleuros* and Phanerogamic parasites and non parasitic diseases

Unit IV: Epidemiology and plant disease management

Epidemiology of crop diseases - role of weather factors in disease development. Disease surveillance and forecasting. Principles of Crop disease management – Prophylaxis: Exclusion, Eradication and direct protection and immunization. Cross protection and host plant resistance. Fungicides – characteristics of an ideal fungicide- classification - Non systemic and systemic fungicides. Formulations –. Precautions and safety measures in handling of fungicides. Methods of application of fungicides.

Unit V: Biological control and biotechnological approaches

Biological control of crop diseases and their scope – biocontrol agents – Fungi, bacteria, – use of plant products, anti-viral principles and biotechnological approaches in plant disease management. Integrated plant disease management.

Practicals

General characters of fungi – mycelium – spores – asexual, sexual, and vegetative spores-sexual and asexual fruiting body in fungi. Study of symptoms, host parasite relationship and systematic position of pathogens causing the following diseases. Study of important taxonomic characters and symptoms produced by *Plasmidiophora*, *Pythium*, *Phytophthora*, *sclerospora*, *Plasmopara*, *Peronospora*, *Albugo*, *Rhizopus*, *Taphrina*, *Capnodium*, *Cercospora*, (*Mycosphaerella*), *Botryodiplodia* (*Botryosphaeria*), *Curvularia*, *Drechslera* (*Helminthosporium*), *Alternaria*, *Venturia*, *Erysiphe*, *Leveillula*, *Phyllactinia*, *Fusarium* (*Gibberella*), *Verticillium*, *Colletotrichum* (*Glomerella*) *Pestalotia* (*Pestalosphaeria*), *Macrophomina*, *Puccinia*, *Uromyces*, *Hemileia*, *Ustilago*, *Sporisorium*, *Urocystis*, *Tilletia*, *Exobasidium*, *Sclerotium*, *Rhizoctonia* (*Thanatephorus*) and *Ganoderma*. Taxonomic characters of *Agaricus*, *Pleurotus* and *Calocybe*. Symptoms of bacterial, phytoplasmal, viral and algal diseases, phanerogamic parasites and non-parasitic diseases. Diagnosis of Plant Pathogens. Various groups of fungicides and antibiotics - Preparation of Bordeaux mixture and Bordeaux paste – Preparation of fungicidal spray solution – Delivery of fungicides, Production of pre-immunized seedlings in citrus – Biological control agents and their mass production – *Trichoderma*, *Pseudomonas* and *Bacillus* - Methods of application of biocontrol agents – Preparation of botanicals – leaf extracts, oil emulsions and anti-viral principles and Meristem tip culture for virus free plantlets production.

Lecture Schedule

1. Definition of Plant Pathology – History of Plant Pathology (major contribution of Micheli, Anton de bary, E.M. Fries, Tulasne brothers, J.G. khun, P.M. A. Millardet, H.M. Ward, Robert Koch, Blakeslee, Paul Neergaard, Harold Henry Flor, E.J. Butler, J.F. Dastur, B.B. Mundkur, K.C.Mehta, G.S. Kulkarni, Pontecarvo and Roper, Kittelson, J.C. Luthra, Vander plank, Norman Borlaugh, Thirumalachar, Van Schmeling and Kulka, S.D. Garrett, Priestly, Van Loon and Van Kammen, C.V. Subramanian, S. Nagarajan, L.M. Joshi, T.J. Burril, E.F.Smith, S.A. Wakesman, M.K. Patel, Lederberg, Stolp, Adolf Eduard Mayer, Dmitry Iwanowski, Beijerinck, W.M. Stanely, Bawden, F.E and Pirie, Max Knoll and Ernst Ruska, Gierer and Scharamm, Lafont, Davis, Doi and Ishie, Needham and Prusiner)
2. Causes of plant diseases – biotic, mesobiotic and abiotic causes– classification of plant diseases- Koch's postulates- types of parasitism in fungi

3. General characters of fungi – thallus- asexual, sexual spores and vegetative resting structures – Asexual and sexual fruiting bodies.
4. Pathogenesis- Pre-penetration, Penetration and post penetration phases
5. Role of enzymes and toxins in plant disease development
6. Survival and spread of plant pathogens
7. Classification of Kingdom – *Protozoa* - important taxonomic characters and symptoms and life cycle of *Plasmodiophora brassicae*
8. Classification of Kingdom – *Chromista*- General characters - Symptoms and life cycle of *Pythium* and *Phytophthora*
9. Symptoms and life cycle of *Sclerospora*, *peronospora*, *Plasmopara*, and *Albugo*
10. Classification of kingdom Fungi- Phylum *Chytridiomycota* and *Zygomycota* - important characters, symptoms and life cycles of *Synchytrium* and *Rhizopus*
11. Classification of Phylum– *Ascomycota*- important characters
12. Symptoms and life cycles of *Taphrina*, *Aspergillus*, *Penicillium*, *Erysiphe*, *Leveillula* and *Phyllactinia*
13. Symptoms and important characters of *Capnodium*, *Helminthosporium*, *Alternaria*, *Cercospora*, and *Venturia*
14. Symptoms and taxonomic characters of *Claviceps*, *Ustilaginoides*, *Fusarium*, *Colletotrichum*, *Pestalotia*, *Macrophomina*, *Botryodiplodia* and *Pyricularia*
15. Classification of *Basidiomycota*- important characters-symptoms and life cycles of *Puccinia*, *Uromyces*, *Hemileia*
16. symptoms and life cycles of *Ustilago*, *Sporisorium*, *Urocystis* and *Tilletia*
17. Symptoms and important characters of *Athelium*, *Thanatephorus* and *Exobasidium* and taxonomic characters of *Ganoderma*, *Agaricus*, *Pleurotus*, and *Calocybe*
18. **Mid semester examination**
19. Plant pathogenic bacteria- classification- general characters – symptoms viz., leaf spot, streak, blight, canker, scab, wilt, crown gall, ring rot, and soft rot.
20. General characters of virus and viroids- Common symptoms of virus and viroid diseases – Chlorosis, mosaic, leaf curl, stripe, vein clearing, vein banding, crinkle, enation, necrosis, dwarfing, rosette, bunchy top, bract mosaic and twisting, cadang cadang of coconut and potato spindle tuber

21. General characters and symptoms of phytoplasma– phyllody and little leaf, and algal parasite – *Cephaleuros* and Phanerogamic parasites – *Cuscuta*, *Orobancha*, *Loranthus* and *Striga*
22. Diagnosis of Plant Pathogens – ooze test, chemo-diagnosis, serodiagnosis (ELISA) and molecular diagnosis (PCR)
23. Epidemiology of crop diseases – role of climate change and weather factors on disease development- disease triangle and Disease tetrahedron
24. Disease surveillance, assessment and forecasting
25. Principles of disease management -Exclusion – plant quarantine- domestic and international and embargo – Exotic diseases, phyto-sanitary certificate
26. Eradication – physical, chemical and cultural methods.
27. Protection – Fungicides- definition- classification of fungicides -characteristics of an ideal fungicide and precautions while handling fungicides
28. Groups of fungicides – copper fungicide and sulphur fungicide, heterocyclic nitrogen compound, quinones, and miscellaneous fungicides.
29. Systemic fungicides, New generation fungicides and Antibiotics
30. Methods of application of fungicides –basic and special methods and application equipment
31. Immunization – Cross protection -Types of resistance, vertical and horizontal resistance, mechanism of resistance - structural and chemical
32. Biological control – definition - mechanism of action – isolation and mass production of *Trichoderma asperellum*, *Pseudomonas fluorescens* & *Bacillus subtilis* - methods of application - plant products – antiviral principles – preparation – methods of application
33. Tissue culture and biotechnological approaches of crop disease management and tissue culture.
34. Integrated management strategies for plant diseases for seed , soil, air and vector borne diseases

Practical Schedule

1. General characters of fungi – Types of mycelium, asexual, sexual and vegetative spores – types of sexual and asexual fruiting bodies.
2. Study of symptoms, fungal characters and host parasite relationships of *Plasmodiophora brassicae* (club root), *Pythium* and *Phytophthora*

3. Study of symptoms, fungal characters and host parasite relationships of *Sclerospora Plasmopara*, *Albugo* and *Rhizopus*
4. Study of symptoms, fungal characters and host parasite relationships of *Taphrina*, *Capnodium*, *Aspergillus*, *Penicillium*, *Venturia*, and *Botryodiplodia*
5. Study of symptoms, fungal characters and host parasite relationships of *Helminthosporium*, *Cercospora*, *Alternaria*, *Pyricularia* and *Colletotrichum*
6. Study of symptoms, fungal characters and host parasite relationships of *Erysiphe*, *Leveillula* and *Phyllactinia*
7. Study of symptoms, fungal characters and host parasite relationships of *Fusarium*, *Claviceps*, *Ustilago* and *Macrophomina*
8. Study of symptoms, fungal characters and host parasite relationships of *Puccinia*, *Uromyces*, and *Hemileia*,
9. Study of symptoms, fungal characters and host parasite relationships *Ustilago*, *sporangium*, *Moesziomyces*, *Thanatephorus*, *Exobasidium*, *Ganoderma*, *Athelium*, *Agaricus*, *Pleurotus* and *Calocybe*
10. Symptoms of bacterial diseases (leaf spot, blight, canker, scab, crown gall, wilt and soft rot) and phytoplasma, algal diseases and phanerogamic parasites
11. Symptoms of viral diseases - Chlorosis, mosaic, vein clearing, vein banding, leaf crinkle and leaf curl, Enation, necrosis, dwarfing, rosette, bunchy top and bract mosaic
12. Field visit to expose the students for disease symptoms and assessment of plant diseases
13. Study of various groups of fungicides and Preparation of Bordeaux mixture and Bordeaux paste. Preparation of fungicidal spray solution.
14. Methods of application of fungicides – seed treatment, dry, wet – foliar spraying and soil drenching, root feeding, corm injection, trunk injection, capsule application, acid delinting, pairing and prolinage and post-harvest treatment.
15. Cross protection – Demonstration of production of pre-immunized seedlings against citrus tristeza and Preparation of leaf extracts, oil emulsion of neem and other botanicals and antiviral principles
16. Biocontrol agents – Mass production of *Trichoderma asperellum* and *Bacillus subtilis* and Meristem tip culture for virus free plantlets production

17.Final Practical examination

Note: Students should submit 50 well-preserved diseased specimens.

References

1. Agrios, G.N. Plant Pathology (2008). 5th Edition Academic Press, New York
2. Nene, Y.L. and Thapliyal, P. N. (1998). Fungicides in plant disease control. Oxford and IBH Publishing Co. Ltd., New Delhi.
3. Prakasam, V., T. Raguchander, and K. Prabakar, (1998). Plant Disease Management, A.E. Publication, Coimbatore.
4. Vidyasekaran, P. (1993). Principles of Plant Pathology, CBS Publishers and Distributors, New Delhi.
5. Alice, D. and Jeyalakshmi (2014). Plant Pathology, AE Publications, Coimbatore.
6. Agrios, G.N. (2005). Plant Pathology – (5th Edition). Academic Press, New York.
7. Richard N. Strange. (2003). Introduction of Plant Pathology - John Wiley & Sons Ltd, London
8. Dale Walters (2009). Disease control in crops. Blackwell Publishing

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2. <https://www.studocu.com/in/document/tamil-nadu-agricultural-university/principles-of-plant-pathology/patho/121016136>
3. https://agri-bsc.kkwagh.edu.in/uploads/department_course/PATH-_121_FUNDAMENTALS_OF_PLANT_PATHOLOGY.pdf
4. https://rafflesuniversity.edu.in/pdf/teaching_content/soas/Fundamentals%20of%20Plant%20Pathology.pdf

AGR 102 Fundamentals of Agronomy (2+1)

Theory

Unit I: Agronomy, Agroclimatic zones and Crops

Agriculture: Definition - importance and scope - branches of agriculture; Agronomy: Definition - art, science, business - meaning and scope of Agronomy - relationship of Agronomy with other disciplines of agricultural science; Agro-climatic zones of India and Tamil Nadu; Field crops and classification; Ecology and ecosystem.

Unit II: Tillage, Crop stand establishment, Crop growth and development

Tillage and tilth: Definition, objectives, types. Seeds and sowing: Definition of crop, variety and seed - methods of sowing - broadcasting, drilling, dibbling, transplanting; Factors affecting crop stand establishment: seed quality, proper tillage, seed rate, time and depth of sowing; Crop density and geometry - its effect on growth and yield; Growth and development of crops: Definition and meaning - stages of crop growth; Factors affecting growth and development - climatic - edaphic - biotic - physiographic and socio economic factors

Unit III: Crop Nutrition

Definition, classification of essential nutrients, criteria of essentiality - role of macro and micro nutrients; Nutrient absorption, active and passive absorption of nutrients, forms of plant nutrients absorbed by plants; Manures and fertilizers, nutrient use efficiency; Sources of nutrients: Inorganic (fertilizers), organic (manures) and bio-fertilizers - major classification and application methods; Integrated Nutrient Management (INM) - meaning, components and advantages of INM; Green manure and green leaf manures - definition, role in crop production - importance, advantages and limitations of green manuring

Unit IV: Water and weed management

Role of water in agriculture - water resources of the World, India and Tamil Nadu; Soil moisture constants: gravitational water, capillary water, hygroscopic water. Irrigation definition and methods of irrigation; Modern techniques of irrigation - drip and sprinkler Irrigation; Weeds: Definition, harmful and beneficial effects and major classification of weeds - crop weed competition; Weed control methods - cultural, physical, chemical and biological method; Integrated weed management; Allelopathy - meaning, types and importance in crop production

Unit V: Cropping system, sustainable agriculture and dry farming concepts

Cropping system: Classification of cropping systems; Factors affecting cropping pattern and cropping system in India; Sustainable agriculture - definition, objectives and importance –

IFS; Natural resources conservation practices; Organic farming; Dry farming: Principles - classification - importance in Indian agriculture.

Practicals

A visit to Instructional farm and identification of crops; Identification of seeds, manures, fertilizers, herbicides; Identification and study of different tillage, intercultural tools and implements; Practice of land configuration and nursery - ploughing/ puddling and application of manures and fertilizers; Practicing different methods of seed treatments and sowing; Working out seed rate and plant population and fertilizer requirement of major field crops; Study and practice of inter cultural operations; Visit to compost production unit; Observing different irrigation methods; Identification of weeds; Study of growth and yield contributing characters and yield estimation of major field crops.

Theory Schedule

1. Agriculture: Definition - importance and scope of agriculture in India - branches of agriculture
2. Agronomy: Definition - meaning and scope - Agronomy art, science and business of crop production - relationship of Agronomy with other disciplines of agricultural science
3. Agro - climatic zones of India and Tamil Nadu
4. Major agricultural seasons and rainfall pattern of India and Tamil Nadu
5. Agronomic classification of field crops
6. Ecology and ecosystem: Concept and types
7. Tillage and tilth: Definition - objectives and types of tillage - advantages and disadvantages
8. Modern concepts of tillage - merits and demerits
9. Seeds and sowing: Definition of crop, variety, and seed - methods of sowing - broadcasting, drilling, dibbling, transplanting
10. Factors affecting crop stand establishment: seed quality, proper tillage, seed rate, time and depth of sowing
11. Crop density and geometry - its effect on growth and yield – gap filling and thinning
12. Growth and development of crops: Definition - stages of crop growth
13. Factors affecting crop growth and development - climatic factors

14. Factors affecting growth and development: edaphic - biotic - physiographic and socio economic factors
15. Crop nutrition: Definition - classification of essential nutrients - criteria of essentiality – role of macro and micro nutrients
16. Nutrient absorption: Active and passive absorption of nutrients - forms of plant nutrients absorbed by plants
17. Sources of nutrients: Inorganic, organic and bio-fertilizers - classification - nutrient use efficiency

18. Mid Semester Examination

19. Integrated Nutrient Management (INM): Meaning, components and advantages of INM
20. Role of organic manures in crop production - time and methods of nutrient application
21. Green manure and green leaf manure: Definition - role in crop production - importance – advantages and limitations of green manuring
22. Role of water in agriculture - water resources of the World, India and Tamil Nadu
23. Soil moisture constants - gravitational water, capillary water, hygroscopic water – Water movement in soil
24. Irrigation: Definition - time and methods
25. Modern techniques of irrigation - drip and sprinkler irrigation
26. Weeds: Definition, harmful and beneficial effects - major classification of weeds - crop weed competition
27. Weed control methods: cultural, physical, chemical and biological methods - Integrated weed management
28. Allelopathy: Definition, types and importance in crop production
29. Cropping system: Cropping pattern, crop rotation - definition - classification of cropping system
30. Factors affecting cropping pattern and cropping system in India
31. Sustainable agriculture: Definition - objectives and importance – integrated farming system
32. Natural resources conservation practices for sustainable agriculture
33. Organic farming: Principles, practices and its importance
34. Dry farming: Concepts and principles - its importance in Indian agriculture

Practical Schedule

1. Visit to wetland farm and identification of crops
2. Visit to garden land, dry land farm and identification of crops
3. Identification of seeds, manures, fertilizers and herbicides
4. Identification and study of primary, secondary tillage and intercultural tools and implements
5. Practicing different methods of land configuration and nursery
6. Practice of ploughing/puddling and application of manures and fertilizers
7. Working out seed rate requirement of major field crops
8. Working out plant population of major field crops
9. Working out fertilizer requirement of major field crops
10. Practicing different methods of seed treatments and sowing
11. Study and practice of inter cultural operations
12. Visit to compost production unit
13. Observing and practicing different irrigation methods
14. Identification of weeds - wetland, garden land and dryland
15. Study of growth parameters of major field crops
16. Study of yield parameters and yield estimation of major field crops

17.Final Practical Examination

References

1. Thavaprakash N and Velayudham K.V. 2022. Fundamentals of Agronomy and Agricultural Heritage. Madras Agricultural Students Union Publishers, Tamil Nadu Agricultural University, Tamil Nadu.
2. Reddy Yellamanda T and Shankar Reddy GH. 2022. Principles of Agronomy. Kalyani Publishers, Ludhiana.
3. Reddy, S.R. 2022. Principles of Crop Production, Kalyani Publisher, Ludhiana.
4. Somasundaram.E and Mohamed Amanullah. 2018. Agronomy principles and practices. New India Publishing agency, New Delhi.
5. Handbook of Agriculture. 2015. Indian Council of Agricultural Research, New Delhi.

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1. www.icar.org.in
2. <http://icar.res.in>
3. www.eagri.org
4. www.agrimoon.com
5. www.agritech.tnau.ac.in

NSS 101 National Service Scheme -I (0+1)

Practicals

Unit I: Youth leadership

Importance and role of youth leadership-Meaning, types and traits of leadership, qualities of good leaders-Life competencies, Definition and importance of life competencies, problem-solving and decision making interpersonal communication

Unit II: Youth development

Youth development programs-Development of youth programs and policy at the national level, state level and voluntary sector-Youth-focused and youth-led organizations

Unit III: Health, hygiene and sanitation

Health, hygiene and sanitation-Definition, needs and scope of health education-Role of food, nutrition, safe drinking water, water borne diseases and sanitation for health-Swachh Bharat Abhiyan activities

Unit IV: National health programmes

National health programmes and reproductive health-Youth health, lifestyle-HIV AIDS and first aid-Healthy lifestyles, HIV AIDS, drugs and substance abuse

Unit V: Home nursing and first aid

Home nursing and first aid.-Youth and yoga. History, philosophy, concept, myths and misconceptions about yoga-Yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

Practical Schedule

1. Importance and role of youth leadership
2. Meaning, types and traits of leadership, qualities of good leaders;
3. Life competencies, Definition and importance of life competencies
4. Problem-solving and decision making interpersonal communication.
5. Youth development programs
6. Development of youth programs and policy at the national level, state level and voluntary sector
7. Youth-focused and youth-led organizations
8. Health, hygiene and sanitation. Definition, needs and scope of health education

9. Mid Semester Examination

10. Role of food, nutrition, safe drinking water, waterborne diseases and sanitation for health
11. Clean India Mission (Swachh Bharat Abhiyan) activities
12. National health programmes and reproductive health
13. Youth health, lifestyle, HIV AIDS and first aid
14. Healthy lifestyles, HIV AIDS, drugs and substance abuse- Home nursing and first aid
15. Youth and yoga-History, philosophy, concept, myths and misconceptions about yoga
16. Yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.

17. Final Practical Examination

e-Resources

1. <https://nss.gov.in/>

NCC 101 National Cadet Corps (NCC) – I (0+1)

Practicals

Unit I: Drill and introductory to arms

Arms Drill – Attention, stand at ease, stand easy, getting on parade, dismissing, and falling out. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa. Guard mounting, guard of honor, Platoon/Coy Drill.

Unit II: Weapon Training

Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting. Loading, cocking, and unloading. The lying position and holding. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing. Characteristics of Carbine and LMG.

Unit III: Map Reading, Field Craft, and Battle Craft Essentials

Introduction to map, scales, and conventional signs. Topographical forms and technical terms. The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.

Unit IV: Field Defences, Watermanship and Terrain Management

Field defences, obstacles, mines and mine laying. Bridging, watermanship. Field water supplies, tracks and their construction. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment.

Unit V: Small-Unit Tactics and Tactical Communications in NCC Training

Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. Types of communication, media, latest trends and developments.

Practical Schedule

1. Arms Drill – Attention, stand at ease, stand easy, getting on parade, dismissing, and falling out.
2. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa.

3. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa.
4. Guard mounting, guard of honor, Platoon/Coy Drill.
5. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting.
6. Loading, cocking, and unloading. The lying position and holding.
7. Trigger control and firing a shot. Range Procedure and safety precautions.
8. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing.

9. Mid Semester Examination

10. Characteristics of Carbine and LMG.
11. Introduction to map, scales, and conventional signs. Topographical forms and technical terms.
12. The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor.
13. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
14. Field defenses, obstacles, mines and mine laying. Bridging, watermanship. Field water supplies, tracks and their construction.
15. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment.
16. Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. - Types of communication, media, latest trends and developments.

17. Final Practical Examination

Reference

1. Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations,
2. Cadet's Handbook (Army Wing),
3. Gupta, R. K. (2020). *Handbook of NCC Cadets for 'A', 'B' and 'C' Certificate Examinations*. Ramesh Publishing House. ISBN: 978-9387918573.

4. St. Joseph's College of Engineering and Technology. (2022). *Cadet's Handbook (Common Subjects for All Wings)*. SJBIT Publication.

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1. [https://en.wikipedia.org/wiki/National_Cadet_Corps_\(India\)](https://en.wikipedia.org/wiki/National_Cadet_Corps_(India))
2. <https://indiancc.mygov.in/>
3. <https://mybharat.gov.in/Gov/Department/national-cadet-corps>

PED 101 Physical Education, First Aid, Yoga Practice and Meditation (0+1)

Practicals

Unit I: Basketball, Kabaddi and Hockey

Basketball, Kabaddi & Hockey - Latest rules, measurements of playfield, specifications of equipment and teaching of skills and techniques.

Unit II: Volleyball and Kho-Kho

Volleyball & Kho-Kho - Latest rules, measurements of playfield, specifications of equipment and teaching of skills and techniques.

Unit III: Athletics

Athletics - Latest rules, measurements of track and field events, specifications of equipment and teaching of skills and techniques.

Unit IV: Training and Coaching Methods

Training and Coaching - Meaning and Concept; Methods of Training; aerobic and anaerobic exercises. Calisthenics, weight training, Circuit training, Fartlek training and Interval training.

Unit V: Balanced Diet, Nutrition, Psychology & Posture

Effects of Exercise on Muscular, Respiratory, Circulatory and Digestive systems; Balanced Diet and Nutrition. Effects of Diet on Performance; Physiological changes due to ageing and role of regular exercise on ageing process; Learning and Theories of learning. Personality, its dimensions and types; Role of sports in personality development; Motivation and Achievements in Sports; Adolescent Problems and its Management; Posture; Postural Deformities and Exercises for good posture.

Practical Schedule

- Class 1 : Skill, technique, style and coaching of major games Basketball.
- Class 2 : Skill, technique, style and coaching of major games Basketball.
- Class 3 : Skill, technique, style and coaching of major games Kabaddi.
- Class 4 : Skill, technique, style and coaching of major games Kabaddi.
- Class 5 : Skill, technique, style and coaching of major games Hockey.
- Class 6 : Skill, technique, style and coaching of major games Hockey.
- Class 7 : Skill, technique, style and coaching of major games Volleyball.
- Class 8 : Skill, technique, style and coaching of major games Kho-Kho.
- Class 9 : Skill, technique, style and coaching of Athletics.
- Class 10 : Skill, technique, style and coaching of Athletics.

- Class 11 : Skill, technique, style and coaching of Athletics.
- Class 12 : Physical education; Training and Coaching - Meaning and Concept; Methods of Training; aerobic and aerobic exercises.
- Class 13 : Calisthenics, weight training, Circuit training and Interval training.
- Class 14 : Fartlek training, Effects of Exercise on Muscular, Respiratory, Circulatory and Digestive systems; Balanced Diet and Nutrition.
- Class 15 : Effects of Diet on Performance; Physiological changes due to ageing and role of regular exercise on ageing process; Learning and Theories of learning.
- Class 16 : Personality, its dimensions and types; Role of sports in personality development; Motivation and Achievements in Sports; Adolescent Problems and its Management; Posture; Postural Deformities and Exercises for good posture.

Class 17 : Final Practical Examination

Learning Outcomes:

At the end of the course, the students will be able to:

1. Demonstrate fundamental skills, techniques and playing styles of Basketball, Kabaddi, Hockey, Volleyball, Kho-Kho and Athletics.
2. Explain and apply basic rules, regulations, field measurements and coaching principles of selected games and athletics.
3. Explain the concepts of physical education, training and coaching and apply appropriate training methods for improving physical fitness and sports performance.
4. Describe the effects of exercise and nutrition on the muscular, respiratory, circulatory and digestive systems and apply basic principles of balanced diet and sports nutrition.
5. Explain the role of exercise, learning, motivation, personality development and sports participation in promoting healthy and productive behaviour.
6. Identify common postural deformities and demonstrate appropriate exercises for maintaining good posture and promoting healthy ageing.

Reference:

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2. Stubbs, R. (Ed.). 2024. *The Sports Book: The Games, the Rules, the Tactics, the Techniques*. DK Publishing. Pages 456.
3. Kumar, P. 2018. Effect of exercise on muscular, respiratory, circulatory and digestive system. In S. Gupta (Ed.), *Foundations of exercise physiology*. Sports Science Press. Pages 356.

4. Eysenck, H. J. 1998. *Dimensions of personality* (308 pp.). Transaction Publishers.
5. Mangal, S. K., & Mangal, S. 2023. *Sports psychology: Concepts and applications*. Taylor & Francis. Pages 452.
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7. Schunk, D. H. 2020. *Learning theories: An educational perspective*. Pearson. Pages 592.
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