

ANNAMALAI UNIVERSITY
FACULTY OF AGRICULTURE

B.Sc. (Agriculture/Horticulture)

SYLLABI

2017-2018 (onwards)

B.Sc. (Agriculture) - List of courses

I semester

Sl. No.	Course code	Title	Credit
1.	AGR 110	Principles of Agronomy and Agricultural Heritage	2+1
2.	AGR 111	Fundamentals of Agricultural Meteorology	1+1
3.	SAC 112	Principles of Analytical Chemistry	1+1
4.	GPB 113	Fundamentals of Plant Physiology	2+1
5.	TAM 114 (OR) ENG 114	தமிழ் இலக்கியங்களில் வேளாண்மையும் அறிவியல் தமிழ்ப் பயன்பாடும் (OR) Development Education	0+1
6.	ENG 115	English for effective Communication	0+1
7.	PED 116	Physical Education	0+1
8.	PED 117	Principles and practices of Yoga	0+1
9.	NSS/NCC 118	National Service Scheme / National Cadet Corps	0+1
Total			6+9=15

HORTICULTURE

B.Sc.(Hort.) --Semester-wise Course Distribution

Semester I

S.No.	Course No.	Title	Credits
01.	HOR 110	Fundamentals of Horticulture	2+1
02.	AGR 111*	Fundamentals of Agricultural Meteorology	1+1
03.	SAC 112*	Principles of Analytical Chemistry	1+1
04	GBP 113*	Fundamentals of Plant Physiology	2+1
05	TAM 114* or ENG 114	தமிழ் இலக்கியங்களில் வேளாண்மை மற்றும் அறிவியல் தமிழ்ப் பயன்பாடும் (Or) Development Education	0+1
06.	ENG 115*	English for Effective Communication	0+1
07	PED 116*	Physical Education	0+1
08.	PED 117*	Principles and practices of yoga	0+1
09.	NSS/NCC 118*	National Service Scheme/National Cadet Corps	0+1
10.	HOR 119	Plant Propagation and Nursery Management	1+1
Total			7+10 =17

ANNAMALAI UNIVERSITY
FACULTY OF AGRICULTURE
B.Sc. (Ag.) SYLLABUS FOR THE YEAR 2017-2018

AGR 110 PRINCIPLES OF AGRONOMY AND AGRICULTURAL HERITAGE (2 +1)
OBJECTIVES

Principles of Agronomy and Agricultural Heritage deal with principles and practices of crop production. To learn about the history of agriculture and agricultural development from ancient to modern age.

THEORY

Unit – I : Introduction to Agriculture

Agriculture – Definition – Importance and scope - Branches of agriculture - Agronomy – Definition – Meaning and scope. National and International Agricultural Research Institutes . Indian economy – National income . Role of women in agriculture.

Unit – II: History of Agriculture Development

History of Agricultural development in world and India. Agricultural heritage – Agriculture in ancient India – Evolution of man and agriculture – Development of scientific Agriculture - Stages of agriculture development - Era of civilization-Importance of Neolithic civilization - Chronological agricultural technology development in India. Kautilya's Arthasasthra – Thirukural - Sangam literature - ITK -Tamil Almanac and rainfall prediction.

Unit – III : Crop Classification and Crop Production

Crops and their classification– Economic importance. Major crops of India and Tamil Nadu. Major soils of India and Tamil Nadu . Factors affecting crop production – climate - edaphic- biotic - physiographic and socio economic factors. Seasons – Agricultural seasons of India and Tamilnadu. Tillage – Definition - Types- Objectives - Modern concepts of tillage.

Unit – IV: Basic Agricultural Operations

Seed rate- Seed treatment. Nursery . Sowing methods . Germination – Factors affecting germination . Plant population and geometry - effect on growth and yield. After cultivation – Thinning - Gap filling . Weeds – Definition – Beneficial and Harmful effects of weed. Irrigation and its role on plant growth. Manures and fertilizers – Time and methods of application – slow release nutrients - ways to improve FUE - INM – concepts and advantages.

Unit – V : Harvesting and Storage

Maturity symptoms of field crops – methods of harvesting – Cleaning and drying - methods of storage.

PRACTICAL

Visit to Experimental farm –Identification of seeds and crops- Crop classification. Identification and study of manures and fertilizers - working out seed rate - Study of seed treatment practices. Study of tillage implements (primary, secondary and special purpose)- Practicing methods of fertilizer applications and its calculations - Different methods of sowing - Study of seeding implements - Study of inter-cultivation implements and practice - Participation in ongoing field operations.

THEORY LECTURE SCHEDULE

1. Agriculture – Definition –Agriculture as Art, science and Business
2. Importance and scope of agriculture in India and Tamilnadu
3. Branches of agriculture
4. Agronomy – definition – meaning and scope
5. National and International Agricultural Research Institutes in India
6. Indian agriculture- Indian economy – National income– Agricultural income in GDP
7. Women in agriculture and empowerment
8. History of agricultural development in the world and India
9. Agricultural heritage – Agriculture in ancient India and Evolution of man
10. Development of scientific agriculture

11. Stages of agriculture development - Era of civilization
12. Importance of Neolithic civilization
13. Chronological agricultural technology development in India
14. Kautilya's Arthasasthra - Sangam literature
15. Tamil Almanac and rainfall prediction- ITK
16. Agronomic classification of crops
17. Economic and agricultural importance of crops in Tamil Nadu and India
18. Mid-semester Examination
19. Major crops of India and Tamil Nadu
20. Major soils of India and Tamil Nadu
21. Factors affecting crop production – climatic – edaphic - biotic- physiographic and socio economic factors
22. Tillage – Definition – objectives -Types of tillage
23. Field preparation - Modern concepts of tillage
24. Seeds - Seed rate – Seed treatment- Different methods of sowing
25. Germination –Factors affecting germination
26. Crop stand establishment – Plant Population and geometry
27. Inter cultivation - Thinning - gap filling and other intercultural operations
28. Weeds – Definition –beneficial and harmful effects of weeds
29. Irrigation and its impact on plant growth
30. Role of manures and fertilizers in crop production
31. Method of fertilizer application – slow release nutrients
32. Ways to improve FUE and concepts of INM
33. Maturity symptoms of field crops and methods of harvesting
34. Cleaning, drying and storage of field crops

PRACTICAL SCHEDULE

1. Visit to college farm to observe wet land, garden land and dry land farming systems
2. Identification of principle crops and seeds
3. Identification of manures and fertilizers
4. Identification of agrochemicals and their usage
5. Identification of green manures and green leaf manures and practicing incorporation methods
6. Identification of tools and implements-Acquiring skill in handling these implements
7. Identification of secondary tillage implements-Acquiring skill in handling these implements
8. Study of labour saving and special purpose implements
9. Practicing different methods of Seed treatments -Nursery preparation
10. Study on different methods of sowing and practicing seeding implements
11. Practicing application methods of manures and fertilizers
12. Acquiring skill in foliar fertilization
13. Calculation on plant population and working out seed rates
14. Practicing thinning, gap filling operations and intercultural operations
15. Working out fertilizer requirement of crops
16. Maturity symptoms and harvesting methods.
17. Orientation for final examination

REFERENCE BOOKS

1. Balasubramaniyan, P. and SP.Palaniappan, 2010. Principles and Practices of Agronomy. Agrobios. Jodhpur - 342 002.
2. Sudhagar Rao, G.B., M. Thiruppathi., C.Ravikumar and K.P.Senthilkumar, 2015. Basic Agronomy, Manibharathi Publications, Chidambaram.
3. Chandrasekaran, B., K. Annadurai and E. Somasundaram. 2010. A Textbook of Agronomy. New Age International Publishers, New Delhi.
4. ICAR. 2011. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.

5. Panda, S.C. 2010. Agronomy. Agro bios (India), Jodhpur - 342 002.
6. Reddy, S.R. 2009. Principles of Agronomy. Kalyani Publishers, New Delhi
7. Yellamananda Reddy, T. and Sankara Reddi, G.H. 2010. Principles of Agronomy. Kalyani Publishers, New Delhi.

e-resource

1. http://www.hillagric.ac.in/edu/coa/agronomy/lect/Teaching_Manual_on_Introductory_Crop_Production.pdf
2. http://www.dphu.org/uploads/attachements/books/books_2248_0.pdf
3. <https://www.scribd.com/doc/119183030/PRINCIPLES-OF-AGRONOMY-AND-AGROMETEROLOGY>
4. <http://www.newagepublishers.com/samplechapter/001757.pdf>
5. http://www.sun.worldcat.org/title/principles_of_agronomy/oclc/689265

AGR 111 FUNDAMENTALS OF AGRICULTURAL METEOROLOGY (1+1)

OBJECTIVES

This course is scheduled to study the problems of plant growth and yield in relation to environmental factors. Agricultural Meteorology is mainly concerned with microclimatology in which the influence of the shallow layer of atmosphere immediately above the surface is studied.

THEORY

Unit -I: Introduction to Meteorology

Meteorology - Importance and scope in crop production – List of extreme points with the Co-ordinates of India and Tamil Nadu - Atmosphere - Composition and vertical layers of atmosphere (stratification) - Climate - Weather - Factors affecting climate and weather - Climatic types - Different agricultural seasons of India and Tamil Nadu .

Unit -II: Solar radiation and temperature

Solar radiation – solar constant and energy balance - Light intensity, quality, direction and duration - Air and Soil temperature - Diurnal variation - importance in crop production- Heat unit and its importance in agriculture. Relative Humidity and its importance .

Unit- III : Atmospheric pressure

Atmospheric pressure - cyclones, anticyclones, tornado, hurricane and storms – swinging of pressure belt - EL Nino and La Nino - definition and causes. Wind and its effect on crops.

Unit -IV: Clouds and Precipitation

Clouds - types and their classification. Precipitation - forms - monsoons of India and Tamil Nadu - rainfall variability drought, flood and their effect - Cloud seeding – Evapotranspiration – transpiration – PET / reference crop ETo.

Unit -V: Agro climatic zones and weather forecasting

Agroclimatic Zones of India and Tamil Nadu – Agroclimatic normals – Basics of weather forecasting –importance, synoptic chart - crop weather calendar - Remote sensing - Impact of climate and weather on crop production - pest and diseases.

PRACTICAL

Agromet Observatory - Site selection and layout. Acquiring skill in the use of different instruments and recording data on rainfall / precipitation temperature, pressure, humidity, wind direction and velocity, solar radiation, sunshine hours, evaporation, evapotranspiration, Lysimeters - Automatic weather station - Preparation of synoptic charts and crop weather calendars -Mapping of Agro climatic Zones.

THEORY LECTURE SCHEDULE

1. Meteorology - - Definition, their importance and scope in crop production.

2. Extreme points / Coordinates of India and Tamil Nadu. Atmosphere - Composition of atmosphere - Vertical layers of atmosphere based on temperature difference / lapse rate.
3. Climate and weather - Factors affecting climate and weather. Macroclimate - Mesoclimate - Microclimate - Definition and their importance
4. Solar radiation - solar constant and energy balance - Wave length characteristics and their effect on crop production - Light - effect of intensity, quality, direction and duration on crop production.
5. Air temperature - Factors affecting temperature. Diurnal and seasonal variation in air temperature - Isotherm, Heat unit and its use - Heat and cold injuries.
6. Role of temperature in crop production. Soil temperature - Importance in crop production. Factors affecting soil temperature, diurnal and seasonal variation in soil temperature.
7. Humidity - Types - Dew point temperature - Diurnal variation in Relative humidity and its effect on crop production - Wind and its role on crop production.
8. Atmospheric pressure, diurnal and seasonal variation - causes for variation - Isobar - Low, depression, anticyclone, Tornado, hurricane.
9. Mid Semester Examination
10. Precipitation - Forms of precipitation - Isohyet - Monsoon - Different monsoons of India - Rainfall variability - Drought and flood - Impact on crop production.
11. Evaporation - Transpiration, evapotranspiration - Potential evapotranspiration / references crop ET_0 - Definition and their importance in agricultural production.
12. Weather forecasting / Warming - Types, importance, Agro Advisory Services, Agromet services for India
13. Agro climatic zones of Tamil Nadu - Agro climatic normals for field crops.
14. Synoptic chart
15. Crop weather calendar.
16. Remote sensing and its application on crop production.
17. Effect of weather and climate on crop production, soil fertility and incidence of pest and diseases.

PRACTICAL SCHEDULE

1. Site selection and layout for Agromet Observatory - Calculation of local time - Time of observation of different weather elements.
2. An introduction to Annamalai University Meteorological Observatory - AWS
3. Measurement of air, soil temperature and grass minimum temperature and study of thermo hygrograph
4. Measurement of solar radiation and sunshine hours
5. Humidity measurements - use of wet and dry bulb, Assmann psychrometer
6. Measurement of wind direction and wind speed
7. Measurement of rainfall - Ordinary and self-recording rain gauges
8. Measurement of Dew - dew gauge.
9. Measurement of atmospheric pressure - barograph
10. Measurement of Evaporation - Open pan evaporimeter- application of evaporation data-
11. Study of Automatic weather station
12. Data analysis for rainfall chart and thermo hygrograph chart data
13. Analysis of weather data - Mean, monthly, annual and diurnal variation of weather variables.
14. Preparation of crop weather calendars and forecast based agro advisories
15. Preparation of Synoptic charts
16. Mapping of agro climatic Zones of India and Tamil Nadu and its characterization.
17. Orientation for final examination

REFERENCE BOOKS

1. Ghadekar, S.R. 2008. Text book on Agro meteorology. Agromet Publishers, Nagpur.
2. Lenka, D. 2000. Climate, Weather and Crops in India, Kalyani Publishers, Ludhiana.
3. Nanjappa and Ramachandrappa. 2007. Manual on Practical Agricultural Meteorology. Agrobios (India), Jodhpur.
4. Panda S.C. 2010. Agro meteorology and contingent crop planning. Agrobios (India), Jodhpur.
5. Prasad, Rao, G.S.L.H.V. 2005. Agricultural Meteorology. Kerala Agricultural University, Press, Thrissur.
6. Radhakrishna Murthy, V. 2002. Basic Principles of Agricultural Meteorology. BS Publications Hyderabad.
7. Radhakrishna Murthy, V.2001. Practical manual on Agricultural Meteorology, Kalyani Publishers, Ludhiana.

e-resource

1. <http://eslamian.iut.ac.ir/sites/eslamian.iut.ac.ir/files/u125/agrometeorology.pdf>
2. http://www.wmo.int/pages/prog/wcp/agm/gamp/documents/WMO_No134_en.pdf
3. <https://www.scribd.com/doc/119183030/PRINCIPLES-OF-AGRONOMY-AND-AGROMETEROLOGY>

SAC 112 PRINCIPLES OF ANALYTICAL CHEMISTRY (1 +1)

OBJECTIVES

This course aims to familiarize students with the basic principles of Analytical Chemistry and instrumentation techniques. The principles and applications of sampling and separation techniques, titrimetric analysis, UV-visible and spectrophotometry, gravimetric analysis and electrochemical methods are emphasized.

THEORY

Unit I: Analytical Principles

General principles of analytical chemistry – common analytical methods – qualitative and quantitative analysis – accuracy and precision of analytical results-Preparation of laboratory reagents.

Unit II: Standards and Indicators

Volumetric analysis – preparation of primary and secondary standards – standardization. Theory of indicators and buffers – acidimetry, alkalimetry, oxidimetry, complexometry and thio-cyanometry.

Unit III: Gravimetric Analysis

Gravimetric analysis – principles of precipitation reactions– solubility product – common ion effect – conditions of precipitation – choice of filters -washing solutions.

Unit IV: Instrumentation

Instrumental analysis – principles and practices of potentiometry, conductometry, colorimetry, spectrophotometry, absorption and emission spectroscopy and chromatography – choice of analytical methods.

Unit V: Radiation Chemistry

Radiation chemistry – radioactivity – radiation decay, detection and measurements - radiological safety – stable isotopes – mass spectroscopy- use of radioactive and stable isotopes in agriculture.

PRACTICAL

Analytical techniques and concepts – Gravimetry – Volumetry- Acidimetry - Alkalimetry– Permanganimetry – Dichrometry - Iodimetry, Complexometry -

Potentiometry – Conductometry -Colorimetry - Spectrophotometry –Turbidimetry – Flame Photometry - Atomic absorption spectrophotometry- Radioactivity.

THEORY LECTURE SCHEDULE

1. General principles in analytical chemistry – common analytical methods – quantitative and qualitative analysis –Accuracy and precision of analytical results.
2. Preparation of laboratory reagents – digestion and distillation techniques.
3. Volumetric analysis – preparation of primary standard solutions.
4. Volumetric analysis – preparation of primary and secondary standard solutions – standardization.
5. Theory of indicators and buffers. Preparation of indicator and buffer solutions.
6. Theory of acidimetry, alkalimetry, oxidometry, complexometry and thiocyanometry – titration curve.
7. Gravimetric analysis – Principles – techniques.
8. Precipitation – solubility product – common ion effect – conditions of precipitation.
9. Mid Semester Examination.
10. Filtration and choice of filters – washing – washing solutions and washing technique.
11. Instrumental methods of analysis- Principles and practices of potentiometry, conductometry, colorimetry and spectrophotometry.
12. Principles and practices of absorption and emission spectroscopy-ICPA
13. Principles and practices of chromatography – Paper chromatography, Gas Chromatography, TLC, HPLC and HPTLC.
14. Radiation chemistry – radioactivity.
15. Radiation – detection and measurement of radio activity – radiological safety.
16. Stable isotopes – Mass spectroscopic measurements and their application in agricultural research.
17. Use of radioactive and stable isotopes in analytical applications.

PRACTICAL SCHEDULE

1. Study of common laboratory glassware and apparatus – General Guidelines in the laboratory- Part - I
2. Volumetric analysis – Preparation of primary , secondary standards and indicators
3. Acidimetry – Standardization of bases
4. Alkalimetry – Standardization of acids
5. Permanganimetry – Standardization of KMnO_4
6. Dichrometry – Standardization of Ferrous Sulphate
7. Iodimetry – Estimation of Copper
8. Complexometry – Estimation of Calcium and Magnesium
9. Principles of Gravimetry- Moisture Estimation
10. Potentiometry and Conductometry - Determination of pH and EC
11. Spectrophotometry – Determination of phosphorus
12. Turbidimetry – Estimation of Sulphur
13. Flame Photometry – Estimation of Potassium
14. Absorption spectrophotometry - Estimation of Fe / Zn / Mn / Cu
15. Identification of sub atomic particles, calculation of Half life and Activity Constant
16. Identification of types of radioactive decay
17. Orientation for final examination

REFERENCE BOOKS

1. Sharma BK. 2012. Instrumental methods of chemical analysis, Goel Publishing House Meerut, 27th edition
2. Gary.O.Christian. 2007. Analytical Chemistry, Wiley Publication.
3. R.M.Verma. 2007. Analytical Chemistry, Theory and Practical, CBS Publisher.
4. Gurdeep R.Chatwal. 2015. Analytical Chemistry, Himalaya Publishing House.
5. Kirupadanam.G.L.D. Vijaya Prasad, O.Varaprasad. 2001. Analytical Chemistry, University Press
6. S.M.Khopkar. 2009. Basic concepts of Analytical Chemistry, New Age International

Pvt. Ltd.

7. David Kealey. 2002. Bios instant notes in analytical chemistry, Taylor & Francis Publisher.
8. R.Gopalan, K.Rengarajan, P.S.Subramanian. Elements of analytical chemistry, Sultan Chand & Sons Publiser.

e-references

1. <http://en.wikipedia.org/wiki/AnalyticalChemistry>
2. <http://www.scribd.com/doc/30296831/Instant-Notes-in-Analytical-Chemistry>

GPB 113 FUNDAMENTALS OF PLANT PHYSIOLOGY (2+1)

OBJECTIVES

To impart basic knowledge on various functions and processes related to crop production, mineral nutrition, plant growth regulators and environmental stresses.

THEORY

Unit I: Plant Water Relations

Importance of Crop Physiology in Agriculture - cell organelle- plasma membrane, chloroplast, mitochondria, peroxisome and vacuole - Structure and role of water -water potential and its components - diffusion - osmosis - imbibition - plasmolysis - Field Capacity and Permanent Wilting Point- Mechanisms of water absorption - Pathways of water movement - Apoplast and symplast - Translocation of water - ascent of sap - mechanisms - Transpiration - significance - structure of stomatal pore- mechanisms of stomatal opening and closing - guttation - antitranspirants.

Unit II: Plant Mineral Nutrition

Criteria of essentiality - classification of nutrients - macro, micro, mobile, beneficial elements and immobile - mechanism of nutrient uptake- Physiological functions, deficiencies and disorders of macro and micro nutrients - Hidden hunger- Foliar nutrition- root feeding and fertigation - sand culture, hydroponics and aeroponics

Unit III: Photosynthesis and Respiration

Light reaction - Photosystems- red drop and Emerson enhancement effect- Photolysis of water and photophosphorylation - Photosynthetic pathways - C₃ and C₄, CAM - difference between three pathways - Factors affecting photosynthesis- Photorespiration - pathway and its significance - Phloem transport - Munch hypothesis - Phloem loading and unloading - Source and sink strength and their manipulations - Glycolysis - TCA cycle - Oxidative phosphorylation - difference between photo and oxidative phosphorylation - energy budgeting - respiratory quotient.

Unit IV: Growth and Development

Growth - phases of growth - Factors affecting growth - Hormones- classifications - Biosynthetic pathway and role of auxins - Biosynthetic pathway and role of gibberellins and cytokinins- Biosynthetic pathway and role of ethylene and ABA- Novel and new generation PGR's - Brassinosteroids and salicylic acid - Growth retardants - Commercial uses of PGR's- Photoperiodism - short, long and day neutral plants - Chailakhyan's theory of flowering- Forms of phytochrome - Pr and Pfr - regulation of flowering - Vernalisation - Theories of vernalisation - Seed germination - physiological and biochemical changes - seed dormancy and breaking methods - Senescence and abscission - physiological and biochemical changes -Physiology of fruit ripening- climacteric and non-climacteric fruits - factors affecting ripening- Manipulations

Unit V: Stress Physiology

Classification of stresses - Physiological changes and adaptations to drought, flooding, high and low temperature, salinity and UV radiation - compatible osmolytes - membrane properties - compartmentalization - stress alleviation - Global warming - green house gases - physiological effects on crops - Carbon Sequestration.

PRACTICAL

Preparation of different types solutions -Measurement of plant water potential by different methods - Estimation of photosynthetic pigments- Chlorophylls and Carotenoids - Determination of stomatal index and stomatal frequency - Measurement of leaf area by different methods - Physiological and Nutritional disorders in crops plants -Estimation of chlorophyll Stability Index - Estimation of Relative Water Content -Determination of photosynthetic efficiency in crop plants – soluble protein - Estimation of Nitrate Reductase activity -Growth Analysis - Bioassay of Cytokinin and GA - Estimation of proline -Demonstration of Practical applications of PGRs. Field visit for foliar diagnosis

THEORY LECTURE SCHEDULE

1. Importance of Crop Physiology in Agriculture – Structure of plasma membrane, chloroplast, mitochondria, peroxisome and vacuole
2. Structure and role of water –water potential and its components – Diffusion – Osmosis – imbibition – Plasmolysis - Field Capacity and Permanent Wilting Point
3. Mechanisms of water absorption – Pathways of water movement – Apoplast and symplast
4. Translocation of water – ascent of sap – mechanisms of xylem transport
5. Transpiration – significance – structure of stomata - mechanisms of stomatal opening and closing – guttation - antitranspirants
6. Mineral nutrition – criteria of essentiality - classification of nutrients – macro, micro, mobile and immobile – mechanism of nutrient uptake
7. Physiological functions and disorders of macro nutrients – Hidden hunger
8. Physiological functions and disorders of micro nutrients
9. Foliar nutrition- root feeding and fertigation – sand culture, hydroponics and aeroponics
10. Light reaction – photolysis of water and photophosphorylation
11. Photosynthetic pathways – C₃ and C₄ cycles
12. CAM pathway – difference between three pathways - Factors affecting photosynthesis.
13. Photorespiration – pathway and its significance
14. Phloem transport – Munch hypothesis - Phloem loading and unloading - Source and sink strength and their manipulations
15. Glycolysis – TCA cycle
16. Oxidative phosphorylation – difference between photo and oxidative phosphorylation – energy budgeting - respiratory quotient
17. Growth – phases of growth – factors affecting growth – Hormones- classifications
18. Mid Semester Examination
19. Biosynthetic pathway and role of auxins
20. Biosynthetic pathway and role of gibberellins and cytokinin
21. Biosynthetic pathway and role of ethylene and ABA
22. Novel growth regulators – Brassinosteroids and salicylic acid – New Generation PGR's
23. Growth retardants and inhibitors -commercial uses of PGR's
24. Photoperiodism - short, long and day neutral plants – Chailakhyan's theory of flowering
25. Forms of phytochrome - Pr and Pfr - regulation of flowering
26. Vernalisation - theories of vernalisation – Lysenko and Chailakhyan's theories
27. Seed germination - physiological and biochemical changes - seed dormancy and breaking methods
28. Senescence and abscission – physiological and biochemical changes
29. Physiology of fruit ripening- climacteric and non climacteric fruits - factors affecting ripening and manipulations
30. Drought - physiological changes - adaptation – compatible osmolytes - alleviation
31. High and low temperature stress – physiological changes - membrane properties - adaptation

32. Salt stress - physiological changes - adaptation – compartmentalization - alleviation
33. Flooding and UV radiation stresses – physiological changes - adaptation
34. Global warming – green house gases –physiological effects on crop productivity- Carbon Sequestration

PRACTICAL SCHEDULE

1. Preparation of different types solutions
2. Measurement of plant water potential by different methods
3. Estimation of photosynthetic pigments- chlorophylls and Carotenoids
4. Determination of stomatal index and stomatal frequency
5. Measurement of leaf area by different methods
6. Physiological and Nutritional disorders in crops plants
7. Estimation of chlorophyll Stability Index
8. Estimation of Relative Water Content
9. Determination of photosynthetic efficiency in crop plants – soluble protein
10. Estimation of Nitrate Reductase activity
11. Growth Analysis - LAI, LAD, SLA, SLW, LAR, NAR, RGR, CGR and HI
12. Bioassay of Cytokinin
13. Bioassay of GA
14. Estimation of proline
15. Demonstration of Practical applications of PGRs.
16. Field visit for foliar diagnosis
17. Orientation for final examination

REFERENCE BOOKS

1. Boominathan, P., R. Sivakumar, A. Senthil, and D. Vijayalakshmi. 2014. Introduction to Plant Physiology, A.E. Publications. Coimbatore
2. Jain, V.K. 2007. Fundamentals of plant physiology, S.Chand and Company Ltd., New Delhi.
3. Taiz. L. and Zeiger. E., 2010 (Fifth edition). Plant Physiology. Publishers: Sinauer Associates, Inc., Massachusetts, USA.

e-references

1. <http://www.plantphys.org>
2. [http://www. Biologie. Uni-hamburg. de/b-online](http://www.Biologie.Uni-hamburg.de/b-online)
3. <http://4e.plantphys.net>
4. www.plantphysiol.org

TAM 114 தமிழ் இலக்கியங்களில் வேளாண்மையும் அறிவியல் தமிழ்ப் பயன்பாடும் (0 + 1)

தொல்காப்பியம் காட்டும் முதற்பொருள், கருப்பொருள் - சங்க இலக்கியத்தில் வேளாண் தொழில் நுட்பங்கள் - பதினெண் கீழ்க்கணக்கு நூல்களில் வேளாண்மை அறிவியல் - பள்ளு இலக்கியங்கள், ஏரெழுபது, இலக்கியத்தில் வேளாண் பொறியியல் - தோட்டவியல் - வனவியல் - மனையியல் - சூழலியல் வேளாண்மைப் பழமொழிகள் - இலக்கியம் காட்டும் வாழ்வியல் நெறிமுறைகள் - இக்கால இலக்கியங்களில் வேளாண்மைச் சிந்தனைகள் - பிழையின்றி எழுதும் முறைகள் - இலக்கியத்தில் மென்திறன்கள் - அறிவியல் தமிழ் வளர்ச்சி நிலைகள் கலைச்சொல்லாக்கம் - மொழி பெயர்ப்பாளர் - ஆட்சித் தமிழ் - உழவர்களுக்கான அறிவிப்புகளை வெளியிடுதல் - கட்டுரைச் சுருக்கம் எழுதுதல் - கணினி உலகில் தமிழ்

செய்முறைப் பயிற்சிகள்

1. தொல்காப்பியம் காட்டும் முதற்பொருள், கருப்பொருள் வழி வேளாண் மரபுகளை அறிதல்
2. சங்க இலக்கியத்தில் வேளாண் தொழில் நுட்பங்கள் - (எட்டுத்தொகை, பத்துப்பாட்டு)
3. பதினெண் கீழ்க்கணக்கு நூல்களில் வேளாண்மை அறிவியல்
4. பள்ளு இலக்கியங்கள், ஏரெழுபது - உழவர் வாழ்வியல் நெறிமுறைகளும் வேளாண்மைத் தொழில் நுட்பங்களும்
5. இலக்கியத்தில் வேளாண் பொறியியல் - தோட்டவியல் - வனவியல் - மனையியல் - சூழலியல்
6. வேளாண்மைப் பழமொழிகள் - உழவு விதை அறிவியல் - நாற்று நடுதல் - எரு இடுதல் - நீர்ப்பாசனம் - களை மேலாண்மை - பயிர்பாதுகாப்பு - அறுவடை - உழவர் சமுதாயம்
7. இலக்கியம் காட்டும் வாழ்வியல் நெறிமுறைகள்
8. இக்கால இலக்கியங்களில் வேளாண்மைச் சிந்தனைகள் - பாரதி, பாரதிதாசன் படைப்புகள் - புதுக்கவிதை - சிறுகதை - புதினம்
9. இடைநிலைப் பருவத்தேர்வு

10. பிழையின்றி எழுதும் முறைகள் - எழுத்துப் பிழைகள் - சொற்பிழைகள் - சொற் பிரிப்புப்பிழை - வாக்கியப்பிழை - மெய்ப்புத் திருத்தம்
11. இலக்கியத்தில் மென்திறன்கள் - தலைமைப்பண்பு - கால மேலாண்மை
12. ஆளுமைப்பண்பு மேம்பாடு - மனித உறவுத்திறன்கள் வளர்த்தல்
13. அறிவியல் தமிழ் வளர்ச்சி நிலைகள், வேளாண் நூல்கள், வேளாண் இதழ்கள்
14. கலைச்சொல்லாக்கம் - வேளாண் கலைச் சொற்களை உருவாக்கும் முறை - தரப்படுத்துதல் - இலக்கிய வேளாண் கலைச்சொற்கள், வட்டார வேளாண்மை வழக்குச் சொற்கள் - அகராதியியல்
15. மொழி பெயர்ப்பு - முக்கிய விதிகள் - படிநிலைகள் - மொழி பெயர்பாளரின் இன்றியமையாப் பண்புகள் - வேளாண் செய்திகளை மொழி பெயர்த்தல்
16. ஆட்சித் தமிழ் - அரசாணைகள் அலுவலகக் கடிதங்கள் - உழவர்களுக்கான அறிவிப்புக்களை வெளியிடுதல் - கட்டுரைச் சுருக்கம் எழுதுதல்
17. கணினி உலகில் தமிழ் - ஒருங்கு குறியீடு பயிற்றுவித்தல் - வலைப் பூக்கள் - விக்கிபீடியா - வேளாண் செய்திகளைப் பதிவேற்றம் செய்தல் - வேளாண் செய்திகளை இணையதள வழி அறிதல்

மேற்பார்வை நூல்கள்

- கந்தசாமி.இல.செ.வேளாண்மையும் பண்பாடும், தமிழ்நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 1974
- கந்தசாமி. இல.செ.இலக்கியத்தில் வேளாண்மை, தமிழ்நாடு வேளாண்மைப்பல்கலைக்கழகம், கோயம்புத்தூர் 1981.
- கந்தசாமி. இல.செ. வேளாண்மை பழமொழிகள், கலைச்செல்வம் பதிப்பகம், கோயம்புத்தூர் 1983.
- குழந்தைசாமி.வா.செ.அறிவியல் தமிழ், பாரதி பதிப்பகம், சென்னை
- மீனாட்சி சுந்தரம். மா. மற்றும் ஏ.இல.விசயலட்சுமி தகவல் தொடர்பில் தமிழ் மொழிப்பயன்பாடு, கே.ஆர்.எ.ஆப்செட் பிரிண்டர், கோவை - 2002
- மணிமேகலை.ம.தமிழ் மொழித் தடத்தில் வேளாண் அறிவியலின் சுவடுகள், தேவி பதிப்பகம், திருச்சிராப்பள்ளி, 2002
- இலக்கியமும் வேளாண்மையும், அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், தஞ்சாவூர், 2006
- தமிழரின் மரபுச்செல்வங்கள், உலகத் தமிழராய்ச்சி நிறுவனம், சென்னை
- சந்திரசேகரன், இரா, மொழிப்பாடம் - படைப்பாக்கத்திறன் வளர்த்தல்
- வேளாண்கலைச்சொல் பேரகராதி, தமிழ் நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 2008.
- பாவேந்தன், இரா, தமிழில் அறிவியல் இதழ்கள், சாமுவேல், ஃபிஷ் கிறின் பதிப்பகம், கோயம்புத்தூர்
- டாக்டர் இராதா செல்லப்பன், கலைச்சொல்லாக்கம், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

ENG 114 DEVELOPMENT EDUCATION (0+1)
(Alternate courses for non-Tamil students)

OBJECTIVES

- Basic principles of learning
- Taxonomy of educational
- Career development and entrepreneurship
- Communication skills

LECTURE SCHEDULE

1. Basic principles of learning. Binary terms viz – growth and development, education – for – life and life – long education, motivation and morale –
2. Occupation and profession, training and education, lateral thinking and convergent thinking, teaching and learning – discussion.
3. Bloom’s classification of educational objectives – Cognitive, Affective, Psychomotor domain(s)
4. Career development – opportunity for graduates of agriculture and allied sciences – discussion
5. Success story of a farmer / entrepreneur – factors involved – role – play
6. Brainstorming – Demonstration
7. Simulation – Educational Simulation-Interactive Teaching - Business Simulation – Company’s annual report for analysis
8. Interpersonal communication – Transactional communication – ice breaker
9. Mid semester examination
10. The conduct of a symposium
11. Conferencing – the concept and presentation of a paper
12. Scientific Article Writing and Editing
13. Popular Article Writing, Editing and Blogging
14. Project proposal
15. Project Report – writing
16. Entrepreneur – intrapreneur – Managing an intrapreneur – motivation and entrepreneurship development – planning, monitoring and evaluation.
17. Orientation for final examination

REFERENCE BOOKS

1. Sudarsanam.R 1985. “Development Education” Chapter 1,2
2. Bloom,B.S.Hastings J.T. and Maduas J.F. 1971. Handbook on Formative and Summative Evaluation of Student Learning Mc Graw Hill Pub, New York.
3. Day, A Robert 1993. “How to Write and Publish a Scientific Paper” CUP.
4. Hariharan.S. 1995. “Brainstorming and Interactive Learning” Research Quarterly, ADU, Coimbatore.
5. Krishna Mohan and Meera Banerji, 1990. “Developing Communication Skills”, Macmillan Pub. Co., Ch.6,9,10,13 and 15.
6. Mathew.M. Monipally. 1997. “The craft of Business Letter Writing”. Tata McGraw Hill Pup., Ch. 10 and Appendix – I.
7. Seely John. 1988. “Communicating in Everyday Life”. The Oxford Guide to Writing and Speaking, OUP. P.1-79.
8. Sudarsanam.R 1985. “Development Education” Chapter 1,2.
9. Taneja.R.P. 1991. Dictionary of Education, Anmol Pub., New Delhi, India.
10. Wallace, L.Michael 1998. “Study Skills in English” CUP Unit.4.

ENG 115 ENGLISH FOR EFFECTIVE COMMUNICATION (0+1)

OBJECTIVES

To make the students competent in Listening – Receptive skill, Speaking – Productive skill, Reading - Receptive skill and Writing - Productive skill

Unit I - LISTENING

Introduction - Listening vs Hearing - Basic listening modes - Types of listening - Intensive and Extensive Listening - Process of Listening - Methods of enhancing listening- Barriers of listening.

Unit II - SPEAKING

Introduction to English Phonology – English Phonemes – Stress and Intonation - Influence of Language 1 on Language 2 - Oral Discourse skills - Principles of speech preparation - Presentation skills - Techniques of speaking.

Unit III - READING

Introduction to Reading - Types of reading - Skimming and Scanning - Idea reading (Reading for information) - Exploratory reading - Study reading (Text reading) - Critical reading - Analytical reading - Note-making – Précis Writing.

Unit IV - WRITING

Word formation (prefix , suffix and word coining) - Word expansion (root word and etymology) - Compound words - Single word substitutes -Abbreviations and acronyms – Sentence agreement - Sentence completion - Sentence correction - Writing definitions - Coherence and cohesion in writing - Mind mapping in writing - Paragraph writing techniques - Thesis sentence writing - Inferential sentence writing - Logical arrangement of sentences - Letter Writing - Text conversion- Interpreting charts , graphs, diagrams into text - Poster making - Essay writing (types of essays).

Unit V

Integrated skills - Group Discussion - Presentation (Seminar) - Forum discussion - Brain Storming – Debate – Writing Fan-mail – e-mail.

PRACTICAL SCHEDULE

- 1. Introduction - Listening vs Hearing - listening modes - Types of listening - Intensive and Extensive Listening**
- 2. Process of Listening - methods of enhancing listening**
- 3. Barriers of listening - Note-taking**
- 4. English Phonology - Influence of Language 1 on Language 2**
- 5. English Stress and Intonation**
- 6. Principles of speech preparation**
- 7. Presentation skills**
- 8. Techniques of speaking**
- 9. Mid semester examination**
- 10. Introduction to reading - Types - Scanning and Skimming - Idea reading (Reading for information) - Exploratory reading - Study reading (Text reading) - Critical reading - Analytical reading - Note-making- précis writing.**
- 11. Word formation(prefix , suffix and word coining) - Word expansion (root word and etymology) -Compound words - Single word substitute -Abbreviations and Acronyms**
- 12. Sentence agreement - Sentence completion - Sentence correction - Writing definitions**
- 13. Writing Practice -Mind mapping - sentence writing - Logical arrangement of sentences**
- 14. Paragraph writing - techniques - Thesis sentence writing – Inferential sentence writing – coherence and cohesion in writing**
- 15. Letter Writing – Types of letters**
- 16. Text conversion- Interpreting charts, graphs diagrams into text - Poster making - Essay writing (types of essays)**
- 17. Orientation for final examination**

REFERENCE BOOKS

1. Bernhardt, E.B., *Reading Development in a Second Language*, 1991, Norwood, N.J., Ablex Publishing Goodale, Malcolm, *Professional Presentations*, 2005, Cambridge University Gerald, J. Alred et. al, *The Professional Writer*, 1992, New York: St. Martin's Press
2. Hariharan, S., *Authentic English for Agriculture and Allied Sciences* 2003, Hyderabad, Orient Longman.
3. Helgesen, Mark *et al.*, *Active listening*, 1997, Cambridge University
4. Jones Daniel, *English Pronouncing Dictionary* 2006, Cambridge University Press.
5. Lynch, Tony and Kenneth Anderson, *Study Speaking*, 1992, Cambridge University.
6. Martin Cutts, *Oxford Guide to Plain English*, 2004, Oxford University Press.
7. Peregoy, S.F. and Boyle, O.F. *Reading, Writing and Learning in ESL*, 1997, New York. Longman.
8. Robert, A. Day *How to Publish a Scientific Article* 2001, Oxford University
9. Sahaney Wandy, et.al. *IELTS, Preparation and Practice*, Oxford University, 2005.
10. Sundararajan, N., "Attentive Listening: How it matters" *University News*, March 19-25, 2005.
11. Sweeney, Simon, *English for Business Communication*, 2003, Cambridge University.
12. Swan, M. and Smith, B. *Learner English*, 1987, Cambridge.
13. Team of authors - *Read Better, Write Better* 2005, Readers Digest.
14. Team of authors - *Cambridge BEC Vantage*, 2005, Cambridge University.
15. Team of authors - *Cambridge IELTS Books 1 to 5*, 2006, Cambridge University.
16. Team of authors - *Objective IELTS*, 2006, Intermediate and Advanced, Cambridge University.
17. Team of authors - *TOEFL ibt-2007-Barron*.

e-references

- | | |
|--|--|
| 1. www.esl--lab.com | 2. www.webenglishteacher.com |
| 3. www.eflweb.com | 4. www.softskills.com |
| 5. www.teachingenglish.org.uk | 6. www.reportingskills.com |
| 7. www.essays.com | 8. www.writing-skills.com |
| 9. www.onestopenglish.com | 10. www.negotiation.com |
| 11. www.tealit.com | 12. www.businessballs.com |
| 13. www.eltweb.com | 14. www.study-habits.com |
| 15. www.angelfire.com | 16. www.timethoughts.com |
| 17. www.primesl.com | 18. www.appliesl.com |
| 19. www.learnbusinessEnglish.com | 20. www.teachersdesk.com |
| 21. www.bogglesworld.com | 22. www.flexbilelearning.net.an |

PED 116 PHYSICAL EDUCATION (0+1)

OBJECTIVES

Exercises for strength, agility, co-ordination, flexibility, co-operation, vitalcapacity endurance, speed and for various systems of our body and team spirit.

Exercise for Good Posture – Conditioning and calisthenics for various Athletic activities *i.e* (a) Before start – Arm stretch, hand stretch and cat stretch (b) Loosening up jogging, bending and twisting (c) Standing – Lateral Arc, triangle and hands to feet pose (d) Sitting – camel kneel, spinal twist and supine knee bend (e) Relaxation – The corpse pose, quick and deep relaxation. Basic gymnastic exercises – participation of athletic events – running, throwing and jumping events.

SKILL DEVELOPMENT IN ANYONE OF THE FOLLOWING GAMES

Warming up, suitable exercise, lead up games, advance skill for all the games.

Basket Ball : Dribbling, pass, two or three men pass, pivot, lay up shot, shooting, pass break, hook pass, screening, positional play, defence and offence tactics.

Volley Ball : Fingering, under arm pass, over head pass, setting, spiking, back pass, jump pass, stunts, elementary dive, flying dive, roll, blocking and various types of services.

Ball Badminton : Grip, service, foot work, fore hand stroke, back hand stroke, lob, smash, volley, wall practice, spin service and defence tactics.

Foot ball : Dribbling, passing, dodging, kicking, heading, screening, chest pass, throwing, dragging, goal kick, defence and offence tactics.

Hockey : Grip, bully, dribbling, hitting, drive, push strokes, scoop, flick, stopping, various types of passes, dodging, defence and offence tactics.

Kho-Kho : Quadra ped, bi-ped, how to given kho, taking a direction, recede, parallel toe method, bullet tow method, distal method, foot out, dive, ring game, chains and pursue and defence skills.

Chess : Moves, move of king, move of pawns, move of rooks, move of bishops, move of queen, move of knights, en passant, castling, check and notation.

Kabaddi : Raid, touch, cant, catch, struggle, various types of defence and offence tactics.

Cricket : Grip, bowling, spin, leg spin, off spin, medium, batting, dive, sweep, mode of delivery, fielding, rolling etc.

Tennis : Grip, forehand drive, back hand drive, stroke, backhand ground stroke, service, volley, smash, wall practice, foot work, defence and offence tactics.

Table Tennis : Grip, tossing and serving, spin serve, rally, smash, flick, defence and offence tactics.

Shuttle Badminton : Grip, foot work, service, setting, smash, volley, forehand and back hand stroke, back hand serve and defence.

Gymnastics : Balanced walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

ATHLETICS

(a) **Sprint :** Medium start, long start, bunch start, set, pick up, finish, upsweep, downsweep, placement, receiving and exchanging.

(b) **Jumps :** Western roll, belly roll, eastern cut off, fass ferry flop, approach, take off, straddle, hitch-kick, handgiving, clearance, landing, strides etc.

(c) **Throws :** Grip, momentum, pre shift, sub phase, the wind up, foot work, entry to the turn, shift, angle of release, follow throw, delivery, front cross step, rear cross step, hop step, fuc method pary obraine, discoput, rotation, carry and glide.

(d) **Hurdles :** Finding lead leg, use of lead leg and trial leg, flight, clearing, finish.

Lead up games, advance skills and game for any one of the above games.

PED 117 PRINCIPLES AND PRACTICES OF YOGA (0 + 1)

OBJECTIVES

To inculcate the basics of yoga for the rejuvenation of body, mind and intellect.

PRINCIPLES (20 hrs)

UNIT I

Introduction to yoga : The origins of yoga – Definitions – concepts – Aims and objectives of yoga – Five principles of yoga – yoga Diet – Classification of Diet

UNIT II

Streams of yoga : Karma yoga – Bhakti yoga – Jnana yoga – Raja yoga (Astanga yoga)

UNIT III

Hatha yoga techniques: Introduction – meaning – Definition – Techniques- Asana - Pranayama – Mudra – Bandha and Shat Kriya

UNIT IV

Scientific effects: Physiological, Psychological, Biochemical effects on various systems of human body:Asana – Pranayama – Mudra - Bandha and Shat Kriya

UNIT V

Meditation and relaxation techniques: Meditation: Introduction – Meaning – Definition - Techniques –Obstacles – Benefits ; Relaxation techniques: IRT – QRT – DRT – Psychic sleep

PRACTICAL SCHEDULE (40 hrs)

1. Prayer - Starting and closing
2. Breathing practices for awareness : Hands in and out breathing,-Hand stretch breathing- Ankle breathing
3. Preparatory practices: Loosening practices- Forward and backward bending – Lateral bending-Alternate toe touching-spinal twisting; Jogging-Forward-Backward and Sideward
4. Suryanamaskar – Start with prayer/mantra – 12 poses
5. Asana: Standing –Periyaasana, Padhastasana, Trikonasana; Siting – Vajrasana,Paschimotasana, Ushtrasana, Vakrasana; Prone – Makrasana; Bhujangasana, Shalabasana, Dhanurasana; Supine – Uttanapadasana, Sarvangasana, Matyasana, Halasana, Chakrasana, Savasana
6. Pranayama –Kapalabathi,Sectional Breathing, Nadi Shuddhi, Sitkari, Sadanta, Nada-Anu-Sandana
7. Mudra – Chin mudra, Chinmaya mudra, Adhi mudra, Brahma mudra, Namaskara mudra, Maha mudra, Vishnu mudra/Nasiga mudra, Yoga mudra
8. Bandha - Jalandra Bandha, Uddiyana Bandha, Moola Bandha
9. Kriya - Kapala pathi, Trataka-Jothi trataka, Jatru trataka; Neti-Jala neti, Sutra neti; Dhouti –Vamana dhouti
10. Dhayana practice – Meditation
11. Relaxation –Instant relaxation technique (IRT); Quick relaxation technique (QRT); Deep relaxation technique (DRT)
12. Practical record preparation

REFERENCE BOOKS

1. Rajayoga – Swamy Vivekananda, Ramakrishnan Ashrama Publication, 1998
2. Shivananda Saraswati, Yoga Therapy, Bihar School of yoga, Munger, 1998
3. Swami Satyananda Saraswati, Asana, Pranayama, Mudra and Bandha, Bihar School of Yoga , Munger, 2002
4. Swami Vishnu Devananda, Mantra and Meditation, International Sivananada Yoga centre, 2002
5. Hatha yoga Pradipika, Swami Satyananda Saraswati, Bihar School of Yoga , Munger, 2004

NSS/NCC 118 NATIONAL SERVICE SCHEME/NATIONAL CADET CORPS

NATIONAL SERVICE SCHEME (NSS)

Orientation – NSS origin – motto – symbol – NSS administration at different levels – programme planning – Rural Projects – Urban projects – Government schemes – Career guidance – Self help groups – Environment protection – Use of natural energy – Conventional energy resources – Soil and Water conservation – Community health programmes – Women and child welfare – Education for all – National days – Commemorative days – NSS thematic programmes – literacy and computer awareness campaigns.

PRACTICAL SCHEDULE

1. Orientation of NSS volunteers and programme coordinator and Programme officers.
2. Origin of NSS in India and its development
3. NSS motto, symbol and NSS awards
4. Organizational set up of NSS at Central, State University and college levels.

5. Programme planning – Theme of the year – planning implementation at PC, PO and NSS volunteer level.
6. Visit to selected village - gathering basic data on socio economic status.
7. Participatory rural appraisal – studying the needs of the target group.
8. Visit of urban slum and gathering data on socio economic status.
9. Self involvement and methods of creating rapport with the target group.
10. Awareness campaign on welfare schemes of the central and state government.
11. Formation career guidance group with NSS volunteers and students welfare unit
12. Cycle rally on environmental protection.
13. Campus development activities – clean environment campaign, formation of plastic free zones.
- 14 – 17: Campus development, tree planting maintenance and greening the campus cleaning.

NATIONAL CADET CORPS (NCC)

General - Military History – Introduction to NCC – Aims of NCC – Principles of NCC, NCC organization, Duties of good citizen – system of NCC training – Foot drill – Arms drill – Guard of Honour – Ceremonial Drill – Weapon training – First aid – Rifle and Light machine gun – Map reading – Civil defence – Leadership.

PRACTICAL SCHEDULE

1. NCC song – Aims and Motto of NCC – Motivation of cadets
2. History of NCC and organization of NCC
3. Food drill – General and word of Command
4. Human Resource Development – Motivation – Duties of Good citizen
5. National Integration – Indian History and Culture
6. Health and Hygiene – Structure and Function of a human body, hygiene and Sanitation
7. Social Service – weaker sections of our society and their needs
8. Self Defence – Theory and practice, prevention of untoward incidence
9. Map reading – introduction to map, and lay out of map
10. Disaster Management Civil defence organization and its duties
11. Communication – Different types – media
12. Signals – introduction to radio, telephony procedures
13. Field Engineering – principles and applications, camouflage and concealment
14. Adventure training introduction, different types
15. First Aid – methods and practices
16. Environment and Ecology – conservation
17. Besides the above schedule, NCC cadets will be involved during important occasions during convocation, Independence day, Republic day, etc.

HORTICULTURE

HOR 110 FUNDAMENTALS OF HORTICULTURE (2+1)

Objectives

To impart the basic knowledge in horticulture and serve as a platform over which advanced technologies of horticulture can be built up.

Theory

Unit-I: Scope and Importance of Horticulture

Scope and importance of horticultural crops – divisions of Horticulture – area and production – export and import – global scenario – classification of horticultural crops – nutritive value – horticultural zones of India and Tamil Nadu – research institutes related with development of horticulture.

Unit-II: Establishment of Orchard and Production Techniques, Factors Influencing Crop Production

Establishment of orchard – principles, planning and layout – different planting systems – Factors limiting Horticultural crop production – manures and manuring – weed management – irrigation methods- influence of soil – physical and chemical properties and climatic factors – light, temperature, photoperiod, relative humidity, rainfall, micro climate, pollution – influence of biotic and abiotic stresses on crop production

Unit-III: Nursery Management and Cropping System

Nursery techniques – vegetable garden – nutrition garden, kitchen garden and other types of gardens – cropping systems – intercropping, multi-tier cropping – cover cropping – planting methods – mulching – principles of organic farming.

Unit-IV: Growth and Development

Bearing habits – flowering, pollination and fruit set – unfruitfulness – fruit drop – causes and prevention – training and pruning – use of growth regulators – rejuvenation of old orchards.

Unit-V: Protected Cultivation and Post-Harvest Technology

Basics of protected cultivation – green house components – structure for environmental control – post-harvest technology – importance and causes for post-harvest losses – maturity indices – harvesting methods.

Practical

Different features of orchard – planning and layout of orchard – tools and implements – different planting systems – nursery beds – training and pruning of fruit crops – preparation of fertilizer mixtures and field application – use of growth regulators – assessment of bearing habits – weed management – irrigation systems – structures for protected cultivation – judging the maturity indices of horticulture crops – harvesting methods and post-harvest handling.

Lecture Schedule

1. Scope, importance and nutritive value of horticultural crops.
2. Divisions of horticulture.
3. Area and production of horticultural crops.
4. Export and import of horticulture crops and their products – global scenario.
5. Classification of horticulture crops.
6. Different climate zones of India and Tamil Nadu in relation to horticulture crops.
7. Principles, planning and layout of Orchard.
8. Different planting systems.
9. Nutrition garden, kitchen garden and other types of garden.
10. Soil and climate factors in relation to horticulture crop production.
11. Factors limiting horticulture crop production.
12. Fertility management in orchards.
13. Weed management and methods of weed control.
14. Methods of irrigation in relation to horticultural crops.
15. Study of cropping systems.
16. Study of multi – tier, inter cropping and cover crops – planting methods.

17. Mid Semester Examination
18. Mulching – role of mulching – types of mulches for horticultural crop production.
19. Principles of organic farming
20. Bearing habits of horticulture crops.
21. Study of flowering, pollination and fruit set in horticulture crops.
22. Unfruitfulness – causes and prevention in horticulture crops.
23. Fruit drop – causes and prevention in horticulture crops.
24. Principles and methods of training in horticulture crops.
25. Principles and methods of pruning in horticulture crops.
26. Methods of rejuvenation of old orchards.
27. Role of growth regulators in horticultural crops.
28. Principles and practices of protected cultivation.
29. Study of different types of media and protected structures for propagation.
30. Study of green house components
31. Environmental control for crop production.
32. Post-harvest technology – importance and causes for post-harvest losses.
33. Maturity indices – climacteric and non climacteric fruits.
34. Harvesting methods.

Practical Schedule

1. Study of different features of orchard.
2. Planning, layout and planting of fruit trees.
3. Identification of tools and implements.
4. Preparation of nursery beds and sowing vegetable seeds and transplanting of vegetable crops.
5. Practicing training of fruit trees.
6. Practicing pruning of fruit trees.
7. Identification of growth regulators and preparation and application.
8. Preparation of fertilizer mixtures and field application.
9. Practicing weeding including chemical weed control.
10. Layout of different irrigation systems and irrigation methods.
11. Study of bearing habits of horticultural crops.
12. Study of different structures for protected cultivation.
13. Study of different media for protected cultivation.
14. Practice in judging the maturity indices of fruits and vegetables.
15. Study of harvesting methods.
16. Visit to green houses.
17. Orientation for final practical examination.

References

1. Chadha, K.L. 2002. Hand book of Horticulture, ICAR, New Delhi.
2. Charles Adams, Mike Early and Jane Brook. 2014. Principles of Horticulture. Routledge.
3. Chattopadhyay, P.K. 2001. A text book on Pomology (Fundamental of fruit growing)
4. Christopher, E.P. 2009. Introductory Horticulture, Biotech books, New Delhi.
5. Jilendra Singh 2006. Basic Horticulture. Kalyani Publishers, New Dehli.
6. Kumar, N. 1997. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil.
7. Kushal Kumar Misra and Rajesh Kumar. 2014. Fundamentals of Horticulture. Biotech Books.
8. Peter, K.V. 2014. Basics of Horticulture. New India Publishing Agency.
9. Pradeep Sinha. 2014. Text Book of Horticulture. Sublime Publications.
10. Schilletter, J.C. and H.W. Richey. 2005. Text Book of General Horticulture, Biotech books, New Delhi.
11. Singh, N.P. 2005 Basic concepts of fruit science. International Book Distributing Co, Lucknow.

12. Vijayakumar U. and M.Rao.2008. Horticulture terms- Defination and termology. IBD Publishers

AGR 111 – FUNDAMENTALS OF AGRICULTURAL METEOROLOGY (1+1)

OBJECTIVES

This course is scheduled to study the problems of plant growth and yield in relation to environmental factors. Agricultural Meteorology is mainly concerned with microclimatology in which the influence of the shallow layer of atmosphere immediately above the surface is studied.

THEORY

Unit -I: Introduction to Meteorology

Meteorology - Importance and scope in crop production – List of extreme points with the Co-ordinates of India and Tamil Nadu - Atmosphere - Composition and vertical layers of atmosphere (stratification) - Climate - Weather - Factors affecting climate and weather - Climatic types - Different agricultural seasons of India and Tamil Nadu .

Unit -II: Solar radiation and temperature

Solar radiation – solar constant and energy balance - Light intensity, quality, direction and duration - Air and Soil temperature - Diurnal variation - importance in crop production- Heat unit and its importance in agriculture. Relative Humidity and its importance.

Unit- III: Atmospheric pressure

Atmospheric pressure - cyclones, anticyclones, tornado, hurricane and storms – swinging of pressure belt - EL Nino and La Nino - definition and causes. Wind and its effect on crops.

Unit -IV: Clouds and Precipitation

Clouds - types and their classification. Precipitation - forms - monsoons of India and Tamil Nadu - rainfall variability drought, flood and their effect - Cloud seeding – Evapotranspiration – transpiration – PET / reference crop ETo.

Unit -V: Agro climatic zones and weather forecasting

Agroclimatic Zones of India and Tamil Nadu – Agroclimatic normals – Basics of weather forecasting –importance, synoptic chart - crop weather calendar - Remote sensing - Impact of climate and weather on crop production - pest and diseases.

PRACTICAL

Agromet Observatory - Site selection and layout. Acquiring skill in the use of different instruments and recording data on rainfall / precipitation temperature, pressure, humidity, wind direction and velocity, solar radiation, sunshine hours, evaporation, evapotranspiration, Lysimeters - Automatic weather station - Preparation of synoptic charts and crop weather calendars -Mapping of Agro climatic Zones.

THEORY - LECTURE SCHEDULE

18. Meteorology - - Definition, their importance and scope in crop production.
19. Extreme points / Coordinates of India and Tamil Nadu. Atmosphere - Composition of atmosphere - Vertical layers of atmosphere based on temperature difference / lapse rate.
20. Climate and weather - Factors affecting climate and weather. Macroclimate - Mesoclimate - Microclimate - Definition and their importance
21. Solar radiation - solar constant and energy balance - Wave length characteristics and their effect on crop production - Light – effect of intensity, quality, direction and duration on crop production.
22. Air temperature - Factors affecting temperature. Diurnal and seasonal variation in air temperature – Isotherm, Heat unit and its use - Heat and cold injuries.
23. Role of temperature in crop production. Soil temperature - Importance in crop production. Factors affecting soil temperature, diurnal and seasonal variation in soil temperature.

24. Humidity – Types - Dew point temperature - Diurnal variation in Relative humidity and its effect on crop production – Wind and its role on crop production.
25. Atmospheric pressure, diurnal and seasonal variation - causes for variation - Isobar - Low, depression, anticyclone, Tornado, hurricane.
26. Mid Semester Examination
27. Precipitation - Forms of precipitation - Isohyet - Monsoon – Different monsoons of India - Rainfall variability - Drought and flood – Impact on crop production.
28. Evaporation - Transpiration, evapotranspiration - Potential evapotranspiration / references crop ET_o - Definition and their importance in agricultural production.
29. Weather forecasting / Warming - Types, importance, Agro Advisory Services, Agromet services for India
30. Agro climatic zones of Tamil Nadu - Agro climatic normals for field crops.
31. Synoptic chart
32. Crop weather calendar.
33. Remote sensing and its application on crop production.
34. Effect of weather and climate on crop production, soil fertility and incidence of pest and diseases.

PRACTICAL SCHEDULE

18. Site selection and layout for Agromet Observatory - Calculation of local time - Time of observation of different weather elements.
19. An introduction to Annamalai University Meteorological Observatory - AWS
20. Measurement of air, soil temperature and grass minimum temperature and study of thermo hygrograph
21. Measurement of solar radiation and sunshine hours
22. Humidity measurements – use of wet and dry bulb, Assmann psychrometer
23. Measurement of wind direction and wind speed
24. Measurement of rainfall - Ordinary and self-recording rain gauges
25. Measurement of Dew - dew gauge.
26. Measurement of atmospheric pressure - barograph
27. Measurement of Evaporation - Open pan evaporimeter- application of evaporation data-
28. Study of Automatic weather station
29. Data analysis for rainfall chart and thermo hygrograph chart data
30. Analysis of weather data – Mean, monthly, annual and diurnal variation of weather variables.
31. Preparation of crop weather calendars and forecast based agro advisories
32. Preparation of Synoptic charts
33. Mapping of agro climatic Zones of India and Tamil Nadu and its characterization.
34. Orientation for final examination

REFERENCE BOOKS

8. Ghadekar, S.R. 2008. Text book on Agro meteorology. Agromet Publishers, Nagpur.
9. Lenka, D. 2000. Climate, Weather and Crops in India, Kalyani Publishers, Ludhiana.
10. Nanjappa and Ramachandrappa. 2007. Manual on Practical Agricultural Meteorology. Agrobios (India), Jodhpur.
11. Panda S.C. 2010. Agro meteorology and contingent crop planning. Agrobios (India), Jodhpur.
12. Prasad, Rao, G.S.L.H.V. 2005. Agricultural Meteorology. Kerala Agricultural University, Press, Thrissur.
13. Radhakrishna Murthy, V. 2002. Basic Principles of Agricultural Meteorology. BS Publications Hyderabad.
14. Radhakrishna Murthy, V. 2001. Practical manual on Agricultural Meteorology, Kalyani Publishers, Ludhiana.

e-resource

4. <http://eslamian.iut.ac.ir/sites/eslamian.iut.ac.ir/files/u125/agrometeorology.pdf>
5. http://www.wmo.int/pages/prog/wcp/agm/gamp/documents/WMO_No134_en.pdf
6. <https://www.scribd.com/doc/119183030/PRINCIPLES-OF-AGRONOMY-AND-AGROMETEROLOGY>

SAC 112 PRINCIPLES OF ANALYTICAL CHEMISTRY (1 +1)

OBJECTIVES: This course aims to familiarize students with the basic principles of Analytical Chemistry and instrumentation techniques. The principles and applications of sampling and separation techniques, titrimetric analysis, UV-visible and spectrophotometry, gravimetric analysis and electrochemical methods are emphasized.

THEORY

Unit I: Analytical Principles

General principles of analytical chemistry – common analytical methods – qualitative and quantitative analysis – accuracy and precision of analytical results- Preparation of laboratory reagents.

Unit II: Standards and Indicators

Volumetric analysis – preparation of primary and secondary standards – standardization. Theory of indicators and buffers – acidimetry, alkalimetry, oxidimetry, complexometry and thio-cyanometry.

Unit III: Gravimetric Analysis

Gravimetric analysis – principles of precipitation reactions– solubility product – common ion effect – conditions of precipitation – choice of filters -washing solutions.

Unit IV: Instrumentation

Instrumental analysis – principles and practices of potentiometry, conductometry, colorimetry, spectrophotometry, absorption and emission spectroscopy and chromatography – choice of analytical methods.

Unit V: Radiation Chemistry

Radiation chemistry – radioactivity – radiation decay, detection and measurements - radiological safety – stable isotopes – mass spectroscopy- use of radioactive and stable isotopes in agriculture.

PRACTICAL

Analytical techniques and concepts – Gravimetry – Volumetry- Acidimetry - Alkalimetry– Permanganimetry – Dichrometry - Iodimetry, Complexometry - Potentiometry – Conductometry -Colorimetry - Spectrophotometry –Turbidimetry – Flame Photometry - Atomic absorption spectrophotometry- Radioactivity.

THEORY SCHEDULE

18. General principles in analytical chemistry – common analytical methods – quantitative and qualitative analysis –Accuracy and precision of analytical results.
19. Preparation of laboratory reagents – digestion and distillation techniques.
20. Volumetric analysis – preparation of primary standard solutions.
21. Volumetric analysis – preparation of primary and secondary standard solutions – standardization.
22. Theory of indicators and buffers. Preparation of indicator and buffer solutions.
23. Theory of acidimetry, alkalimetry, oxidimetry, complexometry and thiocyanometry – titration curve.
24. Gravimetric analysis – Principles – techniques.
25. Precipitation – solubility product – common ion effect – conditions of precipitation.
26. Mid Semester Examination.
27. Filtration and choice of filters – washing – washing solutions and washing technique.
28. Instrumental methods of analysis- Principles and practices of potentiometry, conductometry, colorimetry and spectrophotometry.

29. Principles and practices of absorption and emission spectroscopy-ICPA
30. Principles and practices of chromatography – Paper chromatography, Gas Chromatography, TLC, HPLC and HPTLC.
31. Radiation chemistry – radioactivity.
32. Radiation – detection and measurement of radio activity – radiological safety.
33. Stable isotopes – Mass spectroscopic measurements and their application in agricultural research.
34. Use of radioactive and stable isotopes in analytical applications.

PRACTICAL SCHEDULE

17. Study of common laboratory glassware and apparatus – General Guidelines in the laboratory- Part - I
18. Volumetric analysis – Preparation of primary , secondary standards and indicators
19. Acidimetry – Standardization of bases
20. Alkalimetry – Standardization of acids
21. Permanganimetry – Standardization of $KMnO_4$
22. Dichrometry – Standardization of Ferrous Sulphate
23. Iodimetry – Estimation of Copper
24. Complexometry – Estimation of Calcium and Magnesium
25. Principles of Gravimetry - Moisture Estimation
26. Potentiometry and Conductometry - Determination of pH and EC
27. Spectrophotometry – Determination of phosphorus
28. Turbidimetry – Estimation of Sulphur
29. Flame Photometry – Estimation of Potassium
30. Absorption spectrophotometry - Estimation of Fe / Zn / Mn / Cu
31. Identification of sub atomic particles, calculation of Half life and Activity Constant
32. Identification of types of radioactive decay
17. Orientation for final examination

REFERENCE BOOKS

9. Sharma B.K. 2012. Instrumental methods of chemical analysis, Goel Publishing House Meerut, 27th edition.
10. Gary.O.Christian. 2007. Analytical Chemistry, Wiley Publication.
11. Verma.R.M. 2007. Analytical Chemistry, Theory and Practical, CBS Publisher.
12. Gurdeep R.Chatwal. 2015. Analytical Chemistry, Himalaya Publishing House.
13. Kirupadanam.G.L.D. Vijaya Prasad, O.Varaprasad. 2001. Analytical Chemistry, University Press
14. Khopkar. S.M. 2009. Basic concepts of Analytical Chemistry, New Age International Pvt. Ltd.
15. David Kealey. 2002. Bios instant notes in analytical chemistry, Taylor & Francis Publisher.
16. Gopalan.R., K.Rengarajan and P.S.Subramanian. Elements of analytical chemistry, Sultan Chand & Sons Publiser.

e-references

1. http://en.wikipedia.org/wiki/Analytical_chemistry
2. <http://www.scribd.com/doc/30296831/Instant-Notes-in-Analytical-Chemistry>

GPB 113 FUNDAMENTALS OF PLANT PHYSIOLOGY (2+1)

OBJECTIVES

To impart basic knowledge on various functions and processes related to crop production, mineral nutrition, plant growth regulators and environmental stresses.

THEORY

Unit I: Plant Water Relations

Importance of Crop Physiology in Agriculture – cell organelle- plasma membrane, chloroplast, mitochondria, peroxisome and vacuole - Structure and role of

water –water potential and its components – diffusion – osmosis – imbibition – plasmolysis – Field Capacity and Permanent Wilting Point- Mechanisms of water absorption – Pathways of water movement – Apoplast and symplast - Translocation of water – ascent of sap – mechanisms - Transpiration – significance – structure of stomatal pore- mechanisms of stomatal opening and closing – guttation – antitranspirants.

Unit II: Plant Mineral Nutrition

Criteria of essentiality - classification of nutrients – macro, micro, mobile, beneficial elements and immobile – mechanism of nutrient uptake- Physiological functions, deficiencies and disorders of macro and micro nutrients – Hidden hunger- Foliar nutrition- root feeding and fertigation – sand culture, hydroponics and aeroponics

Unit III: Photosynthesis and Respiration

Light reaction – Photosystems- red drop and Emerson enhancement effect- Photolysis of water and photophosphorylation - Photosynthetic pathways – C₃ and C₄, CAM – difference between three pathways - Factors affecting photosynthesis- Photorespiration – pathway and its significance - Phloem transport – Munch hypothesis - Phloem loading and unloading - Source and sink strength and their manipulations - Glycolysis – TCA cycle - Oxidative phosphorylation – difference between photo and oxidative phosphorylation – energy budgeting - respiratory quotient.

Unit IV: Growth and Development

Growth – phases of growth - Factors affecting growth – Hormones- classifications - Biosynthetic pathway and role of auxins - Biosynthetic pathway and role of gibberellins and cytokinins- Biosynthetic pathway and role of ethylene and ABA- Novel and new generation PGR's – Brassinosteroids and salicylic acid - Growth retardants – Commercial uses of PGR's- Photoperiodism - short, long and day neutral plants – Chailakhyan's theory of flowering- Forms of phytochrome - Pr and Pfr - regulation of flowering – Vernalisation - Theories of vernalisation - Seed germination - physiological and biochemical changes - seed dormancy and breaking methods - Senescence and abscission – physiological and biochemical changes -Physiology of fruit ripening- climacteric and non-climacteric fruits - factors affecting ripening- Manipulations

Unit V: Stress Physiology

Classification of stresses - Physiological changes and adaptations to drought, flooding, high and low temperature, salinity and UV radiation – compatible osmolytes – membrane properties – compartmentalization – stress alleviation - Global warming – green house gases – physiological effects on crops - Carbon Sequestration

PRACTICALS

Preparation of different types solutions -Measurement of plant water potential by different methods - Estimation of photosynthetic pigments- Chlorophylls and Carotenoids - Determination of stomatal index and stomatal frequency - Measurement of leaf area by different methods - Physiological and Nutritional disorders in crops plants -Estimation of chlorophyll Stability Index - Estimation of Relative Water Content -Determination of photosynthetic efficiency in crop plants – soluble protein - Estimation of Nitrate Reductase activity -Growth Analysis - Bioassay of Cytokinin and GA - Estimation of proline -Demonstration of Practical applications of PGRs. Field visit for foliar diagnosis

THEORY LECTURE SCHEDULE

35. Importance of Crop Physiology in Agriculture – Structure of plasma membrane, chloroplast, mitochondria, peroxisome and vacuole
36. Structure and role of water –water potential and its components – Diffusion – Osmosis – imbibition – Plasmolysis - Field Capacity and Permanent Wilting Point
37. Mechanisms of water absorption – Pathways of water movement – Apoplast and symplast
38. Translocation of water – ascent of sap – mechanisms of xylem transport

39. Transpiration – significance – structure of stomata - mechanisms of stomatal opening and closing – guttation - antitranspirants
40. Mineral nutrition – criteria of essentiality - classification of nutrients – macro, micro, mobile and immobile – mechanism of nutrient uptake
41. Physiological functions and disorders of macro nutrients – Hidden hunger
42. Physiological functions and disorders of micro nutrients
43. Foliar nutrition- root feeding and fertigation – sand culture, hydroponics and aeroponics
44. Light reaction – photolysis of water and photophosphorylation
45. Photosynthetic pathways – C₃ and C₄ cycles
46. CAM pathway – difference between three pathways - Factors affecting photosynthesis.
47. Photorespiration – pathway and its significance
48. Phloem transport – Munch hypothesis - Phloem loading and unloading - Source and sink strength and their manipulations
49. Glycolysis – TCA cycle
50. Oxidative phosphorylation – difference between photo and oxidative phosphorylation – energy budgeting - respiratory quotient
51. Growth – phases of growth – factors affecting growth – Hormones- classifications
52. Mid Semester Examination
53. Biosynthetic pathway and role of auxins
54. Biosynthetic pathway and role of gibberellins and cytokinin
55. Biosynthetic pathway and role of ethylene and ABA
56. Novel growth regulators – Brassinosteroids and salicylic acid – New Generation PGR's
57. Growth retardants and inhibitors -commercial uses of PGR's
58. Photoperiodism - short, long and day neutral plants – Chailakhyan's theory of flowering
59. Forms of phytochrome - Pr and Pfr - regulation of flowering
60. Vernalisation - theories of vernalisation – Lysenko and Chailakhyan's theories
61. Seed germination - physiological and biochemical changes - seed dormancy and breaking methods
62. Senescence and abscission – physiological and biochemical changes
63. Physiology of fruit ripening- climacteric and non climacteric fruits - factors affecting ripening and manipulations
64. Drought - physiological changes - adaptation – compatible osmolytes - alleviation
65. High and low temperature stress – physiological changes - membrane properties - adaptation
66. Salt stress - physiological changes - adaptation – compartmentalization - alleviation
67. Flooding and UV radiation stresses – physiological changes - adaptation
68. Global warming – green house gases –physiological effects on crop productivity- Carbon Sequestration

PRACTICAL SCHEDULE

18. Preparation of different types solutions
19. Measurement of plant water potential by different methods
20. Estimation of photosynthetic pigments- chlorophylls and Carotenoids
21. Determination of stomatal index and stomatal frequency
22. Measurement of leaf area by different methods
23. Physiological and Nutritional disorders in crops plants
24. Estimation of chlorophyll Stability Index
25. Estimation of Relative Water Content
26. Determination of photosynthetic efficiency in crop plants – soluble protein
27. Estimation of Nitrate Reductase activity
28. Growth Analysis - LAI, LAD, SLA, SLW, LAR, NAR, RGR, CGR and HI
29. Bioassay of Cytokinin
30. Bioassay of GA

31. Estimation of proline
32. Demonstration of Practical applications of PGRs.
33. Field visit for foliar diagnosis
34. Orientation for final examination

REFERENCE BOOKS

4. Boominathan, P., R. Sivakumar, A. Senthil, and D. Vijayalakshmi. 2014. Introduction to Plant Physiology, A.E. Publications. Coimbatore
5. Jain, V.K. 2007. Fundamentals of plant physiology, S.Chand and Company Ltd., New Delhi.
6. Taiz. L. and Zeiger. E., 2010 (Fifth edition). Plant Physiology. Publishers: Sinauer Associates, Inc., Massachusetts, USA.

e- books and e-references

5. <http://www.plantphys.org>
6. <http://www.Biologie.Uni-hamburg.de/b-online>
7. <http://4e.plantphys.net>
8. www.plantphysiol.org

TAM 114 தமிழ் இலக்கியங்களில் வேளாண்மையும் அறிவியல் தமிழ்ப் பயன்பாடும் (0 + 1)

தொல்காப்பியம் காட்டும் முதற்பொருள், கருப்பொருள் - சங்க இலக்கியத்தில் வேளாண் தொழில் நுட்பங்கள் - பதினெண் கீழ்க்கணக்கு நூல்களில் வேளாண்மை அறிவியல் - பள்ளு இலக்கியங்கள், ஏரெழுபது, இலக்கியத்தில் வேளாண் பொறியியல் - தோட்டவியல் - வனவியல் - மனையியல் - சூழலியல் வேளாண்மைப் பழமொழிகள் - இலக்கியம் காட்டும் வாழ்வியல் நெறிமுறைகள் - இக்கால இலக்கியங்களில் வேளாண்மைச் சிந்தனைகள் - பிழையின்றி எழுதும் முறைகள் - இலக்கியத்தில் மென்திறன்கள் - அறிவியல் தமிழ் வளர்ச்சி நிலைகள் கலைச்சொல்லாக்கம் - மொழி பெயர்ப்பாளர் - ஆட்சித் தமிழ் - உழவர்களுக்கான அறிவிப்புகளை வெளியிடுதல் - கட்டுரைச் சுருக்கம் எழுதுதல் - கணினி உலகில் தமிழ்

செய்முறைப் பயிற்சிகள்

18. தொல்காப்பியம் காட்டும் முதற்பொருள், கருப்பொருள் வழி வேளாண் மரபுகளை அறிதல்
19. சங்க இலக்கியத்தில் வேளாண் தொழில் நுட்பங்கள் - (எட்டுத்தொகை, பத்துப்பாட்டு)
20. பதினெண் கீழ்க்கணக்கு நூல்களில் வேளாண்மை அறிவியல்
21. பள்ளு இலக்கியங்கள், ஏரெழுபது - உழவர் வாழ்வியல் நெறிமுறைகளும் வேளாண்மைத் தொழில் நுட்பங்களும்
22. இலக்கியத்தில் வேளாண் பொறியியல் - தோட்டவியல் - வனவியல் - மனையியல் - சூழலியல்
23. வேளாண்மைப் பழமொழிகள் - உழவு விதை அறிவியல் - நாற்று நடுதல் - எரு இடுதல் - நீர்ப்பாசனம் - களை மேலாண்மை - பயிர்பாதுகாப்பு - அறுவடை - உழவர் சமுதாயம்
24. இலக்கியம் காட்டும் வாழ்வியல் நெறிமுறைகள்
25. இக்கால இலக்கியங்களில் வேளாண்மைச் சிந்தனைகள் - பாரதி, பாரதிதாசன் படைப்புகள் - புதுக்கவிதை - சிறுகதை - புதினம்
26. இடைநிலைப் பருவத்தேர்வு
27. பிழையின்றி எழுதும் முறைகள் - எழுத்துப் பிழைகள் - சொற்பிழைகள் - சொற் பிரிப்புப்பிழை - வாக்கியப்பிழை - மெய்ப்புத் திருத்தம்
28. இலக்கியத்தில் மென்திறன்கள் - தலைமைப்பண்பு - கால மேலாண்மை
29. ஆளுமைப்பண்பு மேம்பாடு - மனித உறவுத்திறன்கள் வளர்த்தல்
30. அறிவியல் தமிழ் வளர்ச்சி நிலைகள், வேளாண் நூல்கள், வேளாண் இதழ்கள்
31. கலைச்சொல்லாக்கம் - வேளாண் கலைச் சொற்களை உருவாக்கும் முறை - தரப்படுத்துதல் - இலக்கிய வேளாண் கலைச்சொற்கள், வட்டார வேளாண்மை வழக்குச் சொற்கள் - அகராதியியல்
32. மொழி பெயர்ப்பு - முக்கிய விதிகள் - படிநிலைகள் - மொழி பெயர்ப்பாளரின் இன்றியமையாப் பண்புகள் - வேளாண் செய்திகளை மொழி பெயர்த்தல்
33. ஆட்சித் தமிழ் - அரசாணைகள் அலுவலக் கடிதங்கள் - உழவர்களுக்கான அறிவிப்புகளை வெளியிடுதல் - கட்டுரைச் சுருக்கம் எழுதுதல்
34. கணினி உலகில் தமிழ் - ஒருங்கு குறியீடு பயிற்றுவித்தல் - வலைப் பூக்கள் - விக்கிபீடியா - வேளாண் செய்திகளைப் பதிவேற்றம் செய்தல் - வேளாண் செய்திகளை இணையதள வழி அறிதல்

மேற்பார்வை நூல்கள்

- கந்தசாமி.இல.செ.வேளாண்மையும் பண்பாடும், தமிழ்நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 1974
- கந்தசாமி. இல.செ.இலக்கியத்தில் வேளாண்மை, தமிழ்நாடு வேளாண்மைப்பல்கலைக்கழகம், கோயம்புத்தூர் 1981.

- கந்தசாமி. இல.செ. வேளாண்மை பழமொழிகள், கலைச்செல்வம் பதிப்பகம், கோயம்புத்தூர் 1983.
- குழந்தைசாமி.வா.செ.அறிவியல் தமிழ், பாரதி பதிப்பகம், சென்னை
- மீனாட்சி சுந்தரம். மா. மற்றும் ஏ.இல.விசயலட்சுமி தகவல் தொடர்பில் தமிழ் மொழிப்பயன்பாடு, கே.ஆர்.எ.ஆப்செட் பிரிண்டர், கோவை – 2002
- மணிமேகலை.ம.தமிழ் மொழித் தடத்தில் வேளாண் அறிவியலின் சுவடுகள், தேவி பதிப்பகம், திருச்சிராப்பள்ளி, 2002
- இலக்கியமும் வேளாண்மையும், அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், தஞ்சாவூர், 2006
- தமிழரின் மரபுச்செல்வங்கள், உலகத் தமிழராய்ச்சி நிறுவனம், சென்னை
- சந்திரசேகரன், இரா, மொழிப்பாடம் - படைப்பாக்கத்திறன் வளர்த்தல்
- வேளாண் கலைச்சொல் பேரகராதி, தமிழ் நாடு வேளாண்மைப் பல்கலைக்கழகம், கோயம்புத்தூர், 2008.
- பாவேந்தன், இரா, தமிழில் அறிவியல் இதழ்கள், சாமுவேல், ஃபிஷ் கிறிஸ்தியன் பதிப்பகம், கோயம்புத்தூர்
- டாக்டர் இராதா செல்லப்பன், கலைச்சொல்லாக்கம், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

ENG. 114 DEVELOPMENT EDUCATION (0+1)
(Alternate courses for non-Tamil students)

OBJECTIVES

- Basic principles of learning
- Taxonomy of educational
- Career development and entrepreneurship
- Communication skills

LECTURE SCHEDULE

18. Basic principles of learning. Binary terms viz – growth and development, education – for – life and life – long education, motivation and morale –
19. Occupation and profession, training and education, lateral thinking and convergent thinking, teaching and learning – discussion.
20. Bloom’s classification of educational objectives – Cognitive, Affective, Psychomotor domain(s)
21. Career development – opportunity for graduates of agriculture and allied sciences – discussion
22. Success story of a farmer / entrepreneur – factors involved – role – play
23. Brainstorming – Demonstration
24. Simulation – Educational Simulation-Interactive Teaching - Business Simulation – Company’s annual report for analysis
25. Interpersonal communication – Transactional communication – ice breaker
26. Mid semester examination
27. The conduct of a symposium
28. Conferencing – the concept and presentation of a paper
29. Scientific Article Writing and Editing
30. Popular Article Writing, Editing and Blogging
31. Project proposal
32. Project Report – writing
33. Entrepreneur – intrapreneur – Managing an intrapreneur – motivation and entrepreneurship development – planning, monitoring and evaluation.
34. Orientation for final examination

REFERENCE BOOKS

11. Sudarsanam.R 1985. “Development Education” Chapter 1,2
12. Bloom, B.S.Hastings J.T. and Maduas J.F. 1971. Handbook on Formative and Summative Evaluation of Student Learning Mc Graw Hill Pub, New York.
13. Day, A. and Robert.1993. “How to Write and Publish a Scientific Paper” CUP.

14. Hariharan.S. 1995. "Brainstorming and Interactive Learning" Research Quarterly, ADU, Coimbatore.
15. Krishna Mohan and Meera Banerji, 1990. "Developing Communication Skills", Macmillan Pub. Co., Ch.6, 9, 10, 13 and 15.
16. Mathew.M. Monipally. 1997. "The craft of Business Letter Writing". Tata McGraw Hill Pup., Ch. 10 and Appendix – I.
17. Seely John. 1988. "Communicating in Everyday Life". The Oxford Guide to Writing and Speaking, OUP. P.1-79.
18. Sudarsanam.R 1985. "Development Education" Chapter 1,2.
19. Taneja.R.P. 1991. Dictionary of Education, Anmol Pub., New Delhi, India.
20. Wallace, L.Michael 1998. "Study Skills in English" CUP Unit.4.

ENG 115 ENGLISH FOR EFFECTIVE COMMUNICATION (0+1)

OBJECTIVES

To make the students competent in Listening – Receptive skill, Speaking – Productive skill, Reading – Receptive skill and Writing – Productive skill

Unit I - Listening

Introduction - Listening vs Hearing - Basic listening modes - Types of listening - Intensive and Extensive Listening - Process of Listening - Methods of enhancing listening - Barriers of listening.

Unit II - Speaking

Introduction to English Phonology – English Phonemes – Stress and Intonation - Influence of Language 1 on Language 2 - Oral Discourse skills - Principles of speech preparation - Presentation skills - Techniques of speaking.

Unit III - Reading

Introduction to Reading - Types of reading - Skimming and Scanning - Idea reading (Reading for information) - Exploratory reading - Study reading (Text reading) - Critical reading - Analytical reading - Note-making – Précis Writing.

Unit IV - Writing

Word formation (prefix , suffix and word coining) - Word expansion (root word and etymology) - Compound words - Single word substitutes - Abbreviations and acronyms – Sentence agreement - Sentence completion - Sentence correction - Writing definitions - Coherence and cohesion in writing - Mind mapping in writing - Paragraph writing techniques - Thesis sentence writing - Inferential sentence writing - Logical arrangement of sentences - Letter Writing - Text conversion- Interpreting charts , graphs, diagrams into text - Poster making - Essay writing (types of essays).

Unit V

Integrated skills - Group Discussion - Presentation (Seminar) - Forum discussion - Brain Storming – Debate – Writing Fan-mail – e-mail.

The Practical Class Schedule for the revised English course is as follows:

18. Introduction - Listening vs Hearing - listening modes - Types of listening - Intensive and Extensive Listening
19. Process of Listening - methods of enhancing listening
20. Barriers of listening - Note-taking
21. English Phonology - Influence of Language 1 on Language 2
22. English Stress and Intonation
23. Principles of speech preparation
24. Presentation skills
25. Techniques of speaking
26. Mid semester examination
27. Introduction to reading - Types - Scanning and Skimming - Idea reading (Reading for information) - Exploratory reading - Study reading (Text reading) - Critical reading - Analytical reading - Note-making- précis writing.

28. Word formation(prefix , suffix and word coining) - Word expansion (root word and etymology) -Compound words - Single word substitute -Abbreviations and Acronyms
29. Sentence agreement - Sentence completion - Sentence correction - Writing definitions
30. Writing Practice -Mind mapping - sentence writing - Logical arrangement of sentences
31. Paragraph writing - techniques - Thesis sentence writing – Inferential sentence writing – coherence and cohesion in writing
32. Letter Writing – Types of letters
33. Text conversion- Interpreting charts, graphs diagrams into text - Poster making - Essay writing (types of essays)
34. Orientation for final examination

REFERENCE BOOKS

18. Bernhardt, E.B., Reading Development in a Second Language, 1991, Norwood, N.J., Ablex Publishing Goodale, Malcolm, Professional Presentations, 2005, Cambridge University Gerald, J. Alred et. al, The Professional Writer, 1992, New York: St. Martin's Press
19. Hariharan, S., Authentic English for Agriculture and Allied Sciences 2003, Hyderabad, Orient Longman.
20. Helgesen, Mark *et al.*, Active listening, 1997, Cambridge University
21. Jones Daniel, English Pronouncing Dictionary 2006, Cambridge University Press.
22. Lynch, Tony and Kenneth Anderson, Study Speaking, 1992, Cambridge University.
23. Martin Cutts, Oxford Guide to Plain English, 2004, Oxford University Press.
24. Peregoy, S.F. and Boyle, O.F. Reading, Writing and Learning in ESL, 1997, New York. Longman.
25. Robert, A. Day How to Publish a Scientific Article 2001, Oxford University
26. Sahaneyya Wandy, et.al. IELTS, Preparation and Practice, Oxford University, 2005.
27. Sundararajan, N., “ Attentive Listening: How it matters ” University News, March 19-25, 2005.
28. Sweeney, Simon, English for Business Communication, 2003, Cambridge University.
29. Swan, M. and Smith, B. Learner English, 1987, Cambridge.
30. Team of authors - Read Better, Write Better 2005, Readers Digest.
31. Team of authors – Cambridge BEC Vantage, 2005, Cambridge University.
32. Team of authors - Cambridge IELTS Books 1 to 5, 2006, Cambridge University.
33. Team of authors - Objective IELTS, 2006, Intermediate and Advanced, Cambridge University.
34. Team of authors -TOEFL ibt-2007-Barron.

e-references :

- | | |
|--|--|
| 23. www.esl--lab.com | 24. www.webenglishteacher.com |
| 25. www.eflweb.com | 26. www.softskills.com |
| 27. www.teachingenglish.org.uk | 28. www.reportingskills.com |
| 29. www.essays.com | 30. www.writing-skills.com |
| 31. www.onestopenglish.com | 32. www.negotiation.com |
| 33. www.tealit.com | 34. www.businessballs.com |
| 35. www.eltweb.com | 36. www.study-habits.com |
| 37. www.angelfire.com | 38. www.timethoughts.com |
| 39. www.primesl.com | 40. www.appliesl.com |
| 41. www.learnbusinessEnglish.com | 42. www.teachersdesk.com |
| 43. www.bogglesworld.com | 44. www.flexbilelearning.net.au |

Exercises for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Exercise for Good Posture – Conditioning and calisthenics for various Athletic activities *i.e* (a) Before start – Arm stretch, hand stretch and cat stretch (b) Loosening up jogging, bending and twisting (c) Standing – Lateral Arc, triangle and hands to feet pose (d) Sitting – camel kneel, spinal twist and supine knee bend (e) Relaxation – The corpse pose, quick and deep relaxation. Basic gymnastic exercises – participation of athletic events – running, throwing and jumping events.

SKILL DEVELOPMENT IN ANYONE OF THE FOLLOWING GAMES

Warming up, suitable exercise, lead up games, advance skill for all the games.

Basket Ball : Dribbling, pass, two or three men pass, pivot, lay up shot, shooting, pass break, hook pass, screening, positional play, defence and offence tactics.

Volley Ball: Fingering, under arm pass, over head pass, setting, spiking, back pass, jump pass, stunts, elementary dive, flaying dive, roll, blocking and various types of services.

Ball Badminton: Grip, service, foot work, fore hand stroke, back hand stroke, lob, smash, volley, wall practice, spin service and defence tactics.

Foot ball: Dribbling, passing, dodging, kicking, heading, screening, chest pass, throwing, dragging, goal kick, defence and offence tactics.

Hockey: Grip, bully, dribbling, hitting, drive, push strokes, scoop, flick, stopping, various types of passes, dodging, defence and offence tactics.

Kho-Kho : Quadra ped, bi-ped, how to given kho, taking a direction, recede, parallel toe method, bullet tow method, distal method, foot out, dive, ring game, chains and pursue and defence skills.

Chess : Moves, move of king, move of pawns, move of rooks, move of bishops, move of queen, move of knights, en passant, castling, check and notation.

Kabaddi: Raid, touch, cant, catch, struggle, various types of defence and offence tactics.

Cricket: Grip, bowling, spin, leg spin, off spin, medium, batting, dive, sweep, mode of delivery, fielding, rolling etc.

Tennis: Grip, forehand drive, back hand drive, stroke, backhand ground stroke, service, volley, smash, wall practice, foot work, defence and offence tactics.

Table Tennis: Grip, tossing and serving, spin serve, rally, smash, flick, defence and offence tactics.

Shuttle Badminton: Grip, foot work, service, setting, smash, volley, forehand and back hand stroke, back hand serve and defence.

Gymnastics: Balanced walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

ATHLETICS

(e) **Sprint:** Medium start, long start, bunch start, set, pick up, finish, upsweep, downsweep, placement, receiving and exchanging.

(f) **Jumps :** Western roll, belly roll, eastern cut off, fass ferry flop, approach, take off, straddle, hitch-kick, handgiving, clearance, landing, strides etc.

(g) **Throws :** Grip, momentum, pre shift, sub phase, the wind up, foot work, entry to the turn, shift, angle of release, follow throw, delivery, front cross step, rear cross step, hop step, fuck method pary obaine, discoput, rotation, carry and glide.

(h) **Hurdles:** Finding lead leg, use of lead leg and trial leg, flight, clearing, finish.

Lead up games, advance skills and game for any one of the above games.

PED 117 PRINCIPLES AND PRACTICES OF YOGA (0 + 1)

PRINCIPLES (20 hrs)

UNIT I

Introduction to yoga : The origins of yoga – Definitions – concepts – Aims and objectives of yoga – Five principles of yoga – yoga Diet – Classification of Diet

UNIT II

Streams of yoga: Karma yoga – Bhakti yoga – Jnana yoga – Raja yoga (Astanga yoga)

UNIT III

Hatha yoga techniques: Introduction – meaning – Definition – Techniques- Asana - Pranayama – Mudra – Bandha and Shat Kriya

UNIT IV

Scientific effects: Physiological, Psychological, Biochemical effects on various systems of human body: Asana – Pranayama – Mudra - Bandha and Shat Kriya

UNIT V

Meditation and relaxation techniques: Meditation: Introduction – Meaning – Definition - Techniques –Obstacles – Benefits; Relaxation techniques: IRT – QRT – DRT – Psychic sleep

PRACTICAL (40 hrs)

13. Prayer - Starting and closing
14. Breathing practices for awareness : Hands in and out breathing,-Hand stretch breathing- Ankle breathing
15. Preparatory practices: Loosening practices- Forward and backward bending – Lateral bending-Alternate toe touching-spinal twisting; Jogging-Forward-Backward and Sideward
16. Suryanamaskar – Start with prayer/mantra – 12 poses
17. Asana: Standing –Periyaasana, Padhastasana, Trikonasana; Siting – Vajrasana,Paschimotasana, Ushtrasana, Vakrasana; Prone – Makrasana; Bhujangasana, Shalabasana, Dhanurasana; Supine – Uttanapadasana, Sarvangasana, Matyasana, Halasana, Chakrasana, Savasana
18. Pranayama –Kapalabathi,Sectional Breathing, Nadi Shuddhi, Sitkari, Sadanta, Nada-Anu-Sandana
19. Mudra – Chin mudra, Chinmaya mudra, Adhi mudra, Brahma mudra, Namaskara mudra, Maha mudra, Vishnu mudra/Nasiga mudra, Yoga mudra
20. Bandha - Jalandra Bandha, Uddiyana Bandha, Moola Bandha
21. Kriya - Kapala pathi, Trataka-Jothi trataka, Jatru trataka; Neti-Jala neti, Sutra neti; Dhouti –Vamana dhouti
22. Dhayana practice – Meditation
23. Relaxation –Instant relaxation technique (IRT); Quick relaxation technique (QRT); Deep relaxation technique (DRT)
24. Practical record preparation

References

6. Rajayoga – Swamy Vivekananda, Ramakrishnan Ashrama Publication, 1998
7. Shivananda Saraswati, Yoga Therapy, Bihar School of yoga, Munger,1998
8. Swami Satyananda Saraswati, Asana, Pranayama, Mudra and Bandha, Bihar School of Yoga , Munger, 2002
9. Swami Vishnu Devananda, Mantra and Meditation, International Sivananada Yoga centre, 2002
10. Hatha yoga Pradipika, Swami Satyananda Saraswati, Bihar School of Yoga , Munger, 2004

NSS/NCC 118 NATIONAL SERVICE SCHEME/NATIONAL CADET CORPS

NSS

Orientation – NSS origin – motto – symbol – NSS administration at different levels – programme planning – Rural Projects – Urban projects – Government schemes – Career guidance – Self help groups – Environment protection – Use of natural energy – Conventional energy resources – Soil and Water conservation – Community health programmes – Women and child welfare – Education for all – National days – Commemorative days – NSS thematic programmes – literacy and computer awareness campaigns.

PRACTICAL SCHEDULE

1. Orientation of NSS volunteers and programme coordinator and Programme officers.
2. Origin of NSS in India and its development
3. NSS motto, symbol and NSS awards
4. Organizational set up of NSS at Central, State University and college levels.
5. Programme planning – Theme of the year – planning implementation at PC, PO and NSS volunteer level.
6. Visit to selected village - gathering basic data on socio economic status.
7. Participatory rural appraisal – studying the needs of the target group.
8. Visit of urban slum and gathering data on socio economic status.
9. Self involvement and methods of creating rapport with the target group.
10. Awareness campaign on welfare schemes of the central and state government.
11. Formation career guidance group with NSS volunteers and students welfare unit
12. Cycle rally on environmental protection.
13. Campus development activities – clean environment campaign, formation of plastic free zones.
- 14 – 17: Campus development, tree planting maintenance and greening the campus cleaning.

NCC

General - Military History – Introduction to NCC – Aims of NCC – Principles of NCC, NCC organization, Duties of good citizen – system of NCC training – Foot drill – Arms drill – Guard of Honour – Ceremonial Drill – Weapon training – First aid – Rifle and Light machine gun – Map reading – Civil defence – Leadership.

PRACTICAL SCHEDULE

18. NCC song – Aims and Motto of NCC – Motivation of cadets
19. History of NCC and organization of NCC
20. Food drill – General and word of Command
21. Human Resource Development – Motivation – Duties of Good citizen
22. National Integration – Indian History and Culture
23. Health and Hygiene – Structure and Function of a human body, hygiene and Sanitation
24. Social Service – weaker sections of our society and their needs
25. Self Defence – Theory and practice, prevention of untoward incidence
26. Map reading – introduction to map, and lay out of map
27. Disaster Management Civil defence organization and its duties
28. Communication – Different types – media
29. Signals – introduction to radio, telephony procedures
30. Field Engineering – principles and applications, camouflage and concealment
31. Adventure training introduction, different types
32. First Aid – methods and practices
33. Environment and Ecology – conservation
34. Besides the above schedule, NCC cadets will be involved during important occasions during convocation, Independence day, Republic day, etc.

HOR 119 PLANT PROPAGATION AND NURSERY MANAGEMENT (1+1)

Objectives

Plant propagation is one of the fundamental agricultural operations which involves multiplication and perpetuation of seeds and planting material to achieve uniform stand of crops with high yield potential. This course deals with different methods of plant propagation and strategies for nursery management of various fruit crops. Knowledge of tools and implements is essential to carry out all scientific horticultural operations and also nursery management practices.

Theory

Unit-I: Methods of propagation

Scope and importance – propagation – overview – methods of sexual and asexual propagation – advantages and disadvantages of sexual and vegetative propagation.

Unit-II: Principles and methods of seed propagation

Seed propagation – seed dormancy- internal and external factors – nursery techniques – protray culture – apomixis – monoembryony, polyembryony – principles – utilization.

Unit-III: Propagation structures

Propagation structures – mist chamber – cold frames – hot beds- humidifiers – green houses – glass houses –tools and implements – use of growth regulators in seed and vegetative propagation – physiological and anatomical basis of vegetative propagation.

Unit-IV: Asexual propagation techniques

Methods and techniques of cuttings, layering, grafting and budding – factors influencing rooting of cuttings, layering, budding, grafting – stock scion relationship – root stock influences – Propagation through specialized organs -- tuber, bulb, corm, bulbils, rhizome, runner, offshoot, crown, slips and sucker.

Unit-V: Micro propagation

Micro propagation - culture media- culture conditions - meristem culture - callus culture – micro grafting- hardening of plants in nurseries - clonal orchards- nursery registration act.

Practical

Nursery bed preparation – seed treatments – seed sowing- – tools implements - Potting medium – containers for propagation of nursery plants - potting – repotting - liquid manures- propagation structures — mist chamber, coldframes, hot beds, poly house, shade net house – raising of rootstocks and scion preparation – different techniques and practices of cutting, layering, grafting and budding – use of specialized organs – rejuvenation – project preparation for commercial nurseries – visit to private nurseries and tissue culture laboratory – working out economics.

Lecture Schedule

- 1. Scope and importance of plant propagation, study of sexual and asexual methods of propagation.**
- 2. Advantages and disadvantages of sexual and vegetative propagation.**
- 3. Seed dormancy – Internal and external factors.**
- 4. Nursery techniques, protray culture, apomixes, monoembryony and polyembryony.**
- 5. Propagation structures - mistchambers, cold frames, hot beds, humidifiers.**
- 6. Construction of green houses and glass houses and its controlling system.**
- 7. Tools and implements.**
- 8. Use of growth regulators in seed and vegetative propagation.**
- 9. Mid Semester Examination**
- 10. Types of cuttings and techniques of preparation.**
- 11. Types of layering and techniques of preparation.**
- 12. Grafting and budding methods and techniques of preparation.**
- 13. Study of stock scion relationship.**
- 14. Influence of root stock on scion - bud wood selection.**
- 15. Propagation by specialized plant parts – bulbs and tubers.**
- 16. Propagation by specialized plant parts – runners, suckers and other organs.**
- 17. Micro propagation techniques**

Practical Schedule

- 1. Preparation of nursery beds, seed treatment and sowing.**
- 2. Identification of various tools and implements.**
- 3. Preparation of pot mixture and study of various containers.**
- 4. Practice in potting, repotting and liquid manures.**
- 5. Study of special structures for propagation viz., mist chamber, cold frames, hot beds, poly house, shade net house.**
- 6. Raising of rootstocks and scion preparation.**

7. Mist propagation techniques.
8. Practice in propagation by cuttings.
9. Practice in propagation by layering.
10. Practice in budding methods.
11. Practice in grafting methods.
12. Use of growth regulators in propagation.
13. Practices in separation and description of plant parts used for propagation.
14. Rejuvenation, top working and bridge grafting.
15. Practice in micro propagation and hardening methods.
16. Visit to tissue culture laboratory and controlled green houses and project preparation for commercial nurseries and visit to private nurseries.
17. Orientation for final practical examination.

References

1. Adams, C.R., K.M. Bandford and M.P. Early. 1996. Principles of Horticulture. CBS Publishes and Distributors 4596/1 – A, Daryaganj, New Delhi-110 002.
2. Bose, T.K., S.K. Mitra, M.K. Sadhu and B. Mitra. 1991. Propagation of Tropical and subtropical Horticultural Crops. Naya Prakash 206, Bidhan Sarani, Calcutta, Six. India.
3. Edmond, J.B., T.L. Senna, F.S. Andrews and R.R. Halfacre. 1990. Fundamentals of Horticulture. Tata McGraw Hill Publishing Co. Ltd.
4. Hartmann, H.T., D.E. Kester, F.T. Davies and R.L. Greeneve. 1997. Plant propagation – Principles and Practices. Prentice Hall of India Private Ltd., New Delhi.
5. Palanisamy, H, S.and K.V. Peter 2007.Tuber and Root Crops Horticultue Science Series. New India Publishing Agency
6. Peter, K.V. S. Rajan and Baby Lissy Markose. 2007. Propagation of Horticultural
7. Crops. Horticulture Science Series-6. New India Publishing Agency
8. Singh, R.S., R. Bhagava. 2014. Propagation of Horticultural Plants Arid and Semi-Arid Regions. New India Publishing Agency
9. Reddy, Y.T.N., T. Janakiram and D. Satyanarayana Reddy. 2001. Scientific Nursery Management. The House of Sarpan (Media), Bangalore.
10. Prasad, S. and V. Kumar. 1999. Green House Management of Horticultural Crops. Agrobios India, Jodhpur.

Web resource

1. www.fruits.com
2. <http://www.ishs.org>