

AGR 304 Principles and Practices of Cropping and Farming System 2+1

Theory

Unit I: Cropping system

Cropping systems - Definition - Principles - Concepts - Classification – mono cropping – intensive cropping - cropping systems of India and Tamil Nadu - Interaction between different cropping systems – Cropping system management – Resource management – land, nutrient, water and weed - Indices for evaluation of cropping systems - Land use - yield advantages - Economic evaluation

Unit II: Farming systems

Farming systems - Definition - Principles - Concepts - Enterprises selection and management - interaction between different enterprises with cropping – scope and advantages of Integrated Farming system – evaluation indicators of integrated farming system - Integrated farming system models for different agro eco-systems - LEIA & HEIA- concepts and principles.

Unit III: Dryland farming and rainfed farming

Dryland farming and rainfed farming - Significance of dry farming in India- History of dry land agriculture- Distribution of Arid and semiarid regions in World, India and Tamil Nadu – Major crops of Dryland in India and Tamil Nadu - Characteristics - constraints

Unit IV: Drought and its management

Drought – Definition - Types and effects of Drought on crop production - Drought management - Contingent crop planning – Mid season correction – Mulching – anti-transpirants - Soil moisture conservation techniques and approaches - Water harvesting, storage and recycling - Integrated dry land technologies – Mechanization - Watershed management

Unit V: Resource management in drylands

Resource management under constraint situation – Cost reduction strategies in crop production – cropping system, farming system and dry farming – Non-monetary inputs and low cost technologies - Labour management – Resource recycling – Residue management – crop and livestock – Conservation agriculture – principles, concept and scope

Practical

Preparation of cropping scheme - working out input requirements for crops, cropping systems - preparation of calendar of operations for wetland, irrigated upland and dry land cropping system - visit to cropping system experiments – working out indices for evaluation of cropping systems – visit to different units: dairy, goat, poultry, fishery. Mushroom, sericulture and biogas - study on evaluation indicators on farming system - preparation of integrated farming system models for different eco-systems - on farm field visit - analysis of farming system models

Zonation of Dry farming regions of Tamil Nadu, India and World. - study of tools and implements and machineries for tillage, sowing and after cultivation - assessing their efficiencies -study of drought management technologies in dryland agriculture - Preparation of contingency crop plan for aberrant rainfall situations - Visit to watershed area to study the impact of various soil and moisture conservation methods.

References

1. Govindan K. and V. Thirumurugan. 2003. Principles and practice of Dryland Agriculture, Kalyani Publishers, Chennai.
2. Pratap Singh, S.M.Mathur and Jaspal Singh 1995. Technology for dryland agriculture. Himanshu Publication, Udaipur.
3. Rengasamy P. 1990. Dry farming Technology in India. Agri publishing Academy, New Delhi.
4. Saxena N.P. 2003. Management of agricultural drought. Oxford and IBH publishing Co pvt. Ltd., New Delhi.
5. Jayanthi, C. Devasenapathy, P and C. Vennila. 2007. Farming Systems. Principles and practices. Satish Serial Publishing House.Delhi.
6. Devasenapathy, P., T. Ramesh and B. Gangwar 2007.Efficiency indices for agriculture management research. New India Publishing agency, Delhi.
7. Jayanthi, C., N. Sakthivel, N. Sankaran and T.M. Thiyagarajan. 2003. Integrated Farming system – A Path to Sustainable Agriculture. TNAU Publication.
8. S.C. Panda. 2003. Cropping and Farming Systems. Agrobios Publishers. Jodhpur.
9. Palaniappan, SP and K. Sivaraman.1996. Cropping systems in the tropics Principles and management. New Age International (P) Ltd., New Delhi.

Theory schedule

1. Cropping system: Definition, Principles and basic concepts
2. Classification of cropping system - Mono cropping, intensive cropping, multiple cropping, mixed cropping
4. Major cropping systems prevailing in India and Tamil Nadu for different agro eco-systems
5. Complementary and competitive interaction in different cropping system – light, nutrient, water and weed
6. Cropping system management : agronomic requirement for crops and cropping system – selection of crops and varieties, tillage and land shaping, plant population and crop geometry
7. Cropping system management: agronomic requirement for crops and cropping system – water management, soil fertility management and plant protection.
8. Indices for evaluation of cropping system – land use, yield advantage and economics
9. Farming system: definition, principles and concepts
10. Farming system - factors influencing choice and size of enterprises
11. Scope and advantages of integrated farming system
12. Allied enterprises for wetland, irrigated upland and dryland – selection and management
13. Interaction between enterprises and cropping – crop + dairy - crop + poultry – crop + fishery - crop + goat - crop + mushroom – crop + sericulture
14. Resource recycling in integrated farming system
15. Integrated Farming System evaluation indicators
16. Integrated farming system - models for wetland, irrigated upland and dryland eco-system
17. **Mid Semester Examination**
18. LEIA & HEIA- concepts and principles
19. Significance and scope of dryfarming in India and History of dryland agriculture
20. Dry farming and rainfed farming: Definition and Characteristics
21. Distribution of arid and semi-arid regions in World, India and Tamilnadu
22. Major crops of dryland in India and Tamilnadu
23. Characteristics of dryland farming and major constraints for crop production
24. Drought: definition, types and effects of drought on crop production
25. Drought management strategies and contingent crop planning: mid season correction, mulching, anti transpirants, in-situ soil moisture conservation techniques and approaches
26. Water harvesting, storage and recycling
27. Integrated dryland technologies and farm mechanization
28. Watershed: definition, principles ,classification and management
29. Resource management under constraint situations for irrigated and rainfed farming
30. Cost reduction strategies in crop production – cropping system, integrated farming system and dry farming
31. Non-monetary inputs and low cost technologies for crop production
32. Crop and livestock residue management
33. Labour management in farming system
34. Conservation agriculture – principles, concepts and scope

Practical schedule

1. Visit to cropping system experiments in wetland, irrigated upland
2. Preparation of cropping scheme for wetland and working out input requirement
3. Preparation of cropping scheme for irrigated upland and working out input requirement
4. Calendar of operations for wet land and irrigated upland cropping system
5. Working out indices for evaluating the cropping system
6. Visit to dairy, goat and poultry units
7. Visit to fishery unit
8. Visit to mushroom unit
9. Visit to sericulture and biogas unit
10. Preparation and evaluation of integrated farming system models : wetland eco-system

11. Preparation and evaluation of integrated farming system models : irrigated upland and dryland eco systems
12. On-farm visit to cropping fields and integrated farming system units
13. Zonation of Dry farming regions of Tamil Nadu, India and World.
14. Study of tools, implements, and machineries for tillage, sowing and after cultivation and assessing their efficiencies
15. Drought management technologies in dryland agriculture - Preparation of contingency crop plan for aberrant rainfall situations
16. Visit to watershed area to study the impact of various soil and moisture conservation methods.

17. Final Practical Examination

SAC 302 Soil Resource Inventory and Problem Soils 2+1

Theory

Unit I: Concepts of Soil Survey

Soil resource inventory - Early and modern concepts. Standard soil survey - Its scope and objectives - Soil systematics - pedon and poly pedon – Soil mapping units – Methods and types of soil survey – Soil maps.

Unit II: Remote Sensing and GIS

Remote Sensing - principles and basic concepts – sensors and platforms – Aerial and satellite remote sensing – Use of aerial and satellite data in soil resource inventory – Principles of GIS, GPS and GPRS

Unit III: Soil Taxonomy

Soil Taxonomy – USDA system of soil classification and its advantages – its structure, diagnostic horizons – Criteria used for classification – Soils of India and Tamil Nadu.

Unit IV: Land Use Classification

Soil survey reports – Interpretation and interpretative groupings - Land capability, irrigability and suitability classifications – Storie index – Productivity potential – Land suitability for field crops, horticultural crops and forest trees.

Unit V: Soil Related Constraints

Problem soils – physical and chemical constraints – Slow permeable, excessively permeable, surface crusting, sub surface hard pan and fluffy paddy soils - Acid and salt affected soils – Genesis, characteristics, reclamation and management of problem soils. Quality of irrigation waters – water quality appraisal – effect of poor quality waters on soil and crop growth and management.

Practical

Morphological study of soil profile – Study of base maps, aerial photographs and satellite imagery – Interpretation of soil survey data and maps. Analysis of problem soils – lime requirement of acid soil – Estimation of CEC, exchangeable cations and ESP – Gypsum requirement of sodic soils. Analysis of irrigation waters – pH, EC, TSS anions and cations – quality appraisal of irrigation waters. Field visit to problem soil area.

References

1. Buol, S.W., Hole, F.D., McCracken, R.J., (1973). Soil genesis and classification. Oxford and IBH publishing Co., New Delhi.

2. Lillesand, T.M. and Kiefer, R.W., 1987. Remote sensing and image interpretation, John Wiley and sons, inc, New York.
3. Sehgal, J.2005. Pedology concepts and applications, Kalyani Publishers, New Delhi.
4. Soil Survey Division Staff 1999. Soil Survey Manual, USDA publication.
5. Steven, M.D. and Clark, J.A. 1990. Applications of Remote Sensing in Agriculture, Cambridge University, UK.
6. USDA 1954. Diagnosis and improvements of Saline and alkali soils. (Ed) L.A.Richards. Handbook No.60. USDA Washington DC.
7. Anji Reddy, M., 2002. Remote sensing and geographical information systems, BS publication, Hyderabad.
8. Somani, L.L. and K.L.Totawat 1993. Management of Salt Affected Soils and Water.

Web resources

1. <ftp://ftp-fc.sc.egov.usda.gov/NSSC/NCSS/Conferences/scanned/>
2. ftp://ftp-fc.sc.egov.usda.gov/NSSC/Lab_References/SSIR_51.pdf
3. tp://ftp-fc.sc.egov.usda.gov/NSSC/Lab_References/SSIR_51.pdf
4. www.iuss.org/Bulletins/00000096.pdf
5. www.oosa.unvienna.org/pdf/sap/centres/rscurrE.pdf -
6. en.wikipedia.org/wiki/Geographic_information_system
7. ww.annauniv.edu/cia/Curric%20Syllabi/M.../Remote%20Sensing.pdf
8. www.csre.iitb.ac.in/~dd/detail.html
9. www.dvsinstitute.org/forms/pg/M.Sc.%20-%20RS%20&%20GIS-350.pdf
10. inkinghub.elsevier.com/retrieve/pii/S0166248197800335
11. www.scribd.com/doc/40246764/Description-Pedon-Copy -
12. [www.angrau.net/BSc\(Ag\)CourseCurriculum.htm](http://www.angrau.net/BSc(Ag)CourseCurriculum.htm)
13. ww.springerlink.com/index/BJG00EL8FLNTFUNL.pdf
14. www.eurojournals.com/ejsr_42_2_10.pdf
15. inkinghub.elsevier.com/retrieve/pii/S0166248197800335
16. www.springerlink.com/index/R177R74472222UN.pdf - Similar
17. content.alterra.wur.nl/Internet/webdocs/ilri-publicaties/.../Bib10.pdf
18. www-wds.worldbank.org/external/.../INDEX/multi_page.txt - Cached
19. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1999/09/14/000094946_99061705513766/Rendered/INDEX/multi_page.txt
20. openaccess.icrisat.org/.../Proceedings-integrated-watershed-management-for-land-Asia.pdf
21. www.springerlink.com/index/jlu87tk58363.pdf
22. www.buc.edu.in/sde_book/msc_soil.pdf

Theory schedule

1. Early and modern concepts of soil resource inventory
2. Concepts of Standard Soil Survey, its scope and objectives
3. Soil systematics – pedon, polypedon, control section and three dimensional nature of soil body
4. Soil mapping units – soil series, soil association, soil complex, variants, inclusions and miscellaneous land types.
5. Methods soil survey – free and grid. Types of soil survey – exploratory and reconnaissance
6. Types of soil survey – detailed and semi detailed
7. Remote sensing– basic principles and concepts
8. Remote sensing sensors and platforms
9. Aerial remote sensing – kinds of aerial photographs, stereovision and air-photo interpretation
10. Satellite remote sensing – data acquisition, kinds of satellite data and image interpretation and principles of GIS, GPS and GPRS
11. Soil classification – principles and concepts.
12. Soil taxonomy – advantages. Surface diagnostic horizons
13. Soil taxonomy – advantages. Sub surface diagnostic horizons
14. Soil taxonomy – structure and differentiating characters and limitations
15. Soil orders and their characteristics
16. Soil orders and their distribution in world
17. Soils of India and Tamil Nadu

18. Mid Semester Examination

19. Aerial and Satellite remote sensing and soil mapping
20. Soil maps, kinds of soil maps and their preparation
21. Soil survey report preparation and interpretation
22. Interpretative groupings of soils. Land capability classification
23. Land irrigability classification, Storie index and productivity potential
24. Land suitability classification for field crops, horticultural crops and forest trees
25. Soil physical constraints – slow permeable, excessively permeable soils, characteristics and management
26. Soil crusting, sub soil hard pan and fluffy paddy soils, characteristics and management
27. Acid soil – genesis and characteristics.
28. Lime requirement of acid soil, liming materials and reclamation of acid soil
29. Genesis and classification of saline sodic soils
30. Saline soil – characteristics and their management
31. Sodic soil – characteristics, gypsum requirement and reclamation
32. Quality of irrigation waters and quality criteria
33. Irrigation water quality appraisal – USDA system, SAR, RSC, SSP, PSI and PS
34. Effect of poor quality waters on soils and crop growth and management.

Practical schedule

1. Profile description
2. Study of base maps – topo-sheets and cadastral maps
3. Aerial photographs and satellite imagery interpretation
4. Estimation of lime requirement of acid soil
5. Estimation of CEC in sodic soil part I
6. Estimation of CEC in sodic soil part II
7. Estimation of Exchangeable cations and working out ESP
8. Estimation of gypsum requirement of sodic soil
9. Land suitability for field crops, horticultural crops and forest trees
10. Estimation of pH, EC, TSS and chloride in irrigation water
11. Estimation of carbonate and bicarbonate in irrigation water
12. Estimation of sulphate in irrigation water by turbidimetry
13. Estimation of calcium and magnesium in irrigation water

14. Estimation of sodium and potassium in irrigation water
15. Classification of irrigation waters as per USSL and other systems
16. Field visit to problem soils area and soil survey unit
- 17. Final Practical Examination**

Theory

Unit I: Reproductive systems in plant breeding

Objectives and role of plant breeding - historical perspective – activities in Plant Breeding. Centres of origin – contribution of Vavilov, Harlan, Zhukovsky – law of homologous series. Plant genetic resources – importance – germplasm – types – activities – gene erosion - gene bank – collection - conservation – types of conservation – agencies – quarantine. Germplasm: evaluation – use of descriptors, documentation, utilization; Agencies – national and international; germplasm exchange – quarantine. Modes of reproduction – sexual – asexual - self and cross fertilization – significance of pollination. Self incompatibility – classifications – mechanisms – application – measures to overcome and limitations. Sterility – male sterility – introduction – classification – CMS, GMS, CGMS-inheritance and applications. TGMS, PGMS, Gametocides, Transgenic Male sterility and applications. Apomixis – introduction - classification-applications; Parthenocarpy and its types.

Unit II: Breeding methods of self pollinated crops

Basic biometrics-nature and significance of qualitative and quantitative variation-phenotypic, genotypic and environmental-heritability and genetic advance. Plant introduction as a breeding method – types of introduction – objectives – quarantine - acclimatization – achievements - merits and demerits. Genetic basis of self pollinated crops – Vilmorin principle of progeny selection - Johannsen's pure line theory. Breeding methods for self pollinated crops without involving artificial hybridization: Pure line selection – procedure – merits and demerits – achievements; Mass selection in self pollinated crops – procedure - types – comparison of mass and pureline selection – achievements. Breeding methods of self pollinated crops involving artificial hybridization: Creating variability in self pollinated crops - Hybridization and selection – objectives types – choice of parents – combining ability - combination breeding and transgressive breeding – steps in hybridization - kinds of emasculation. Pedigree breeding – procedure – mass pedigree – merits – demerits – achievements; Bulk breeding – procedure – merits – demerits – achievements. Comparison of pedigree and bulk breeding methods. Single Seed Descent (SSD) method – procedure – application – merits and demerits. Backcross breeding – genetic principles – prerequisites – procedures for transferring dominant and recessive genes. Back cross breeding – merits – demerits – multi lines and multi blends - population improvement approach in self-pollinated crops.

Unit III: Breeding methods of cross pollinated crops and clonally propagated crops

Genetic structure of a population in cross pollinated crop – Hardy Weinberg law – gene frequencies in random mating population – principles in population improvement. Breeding methods of cross pollinated crops without involving artificial hybridization: Mass selection in cross pollinated crops – modified mass selection – unit selection – mass selection with progeny testing – half sib family selection – full sib family selection. Breeding methods of cross pollinated crops involving artificial hybridization: Recurrent selection principles – types – merits and demerits; Heterosis breeding – genetic basis – hybrid vigour – estimation of heterosis – inbreeding depression – development of inbreds; Heterosis breeding – procedure – use of male-sterility systems and manual emasculation in hybrid seed production – maintenance of parental lines -types of hybrids – achievements – merits and demerits; Synthetics and composites - steps in development of synthetics and composites – achievements – merits and demerits. Genetic characters of asexual reproduction – breeding methods – clonal selection – hybridization and clonal selection – merits and demerits – achievements; Chimeras and its types; Tree breeding – clonal orchards.

Unit IV: Special breeding methods

Polyploidy breeding – classification – induction of polyploidy – diploid x tetraploid and diploid x hexaploid crosses - achievements – limitations. Wide hybridization-history-importance-

barriers and techniques for overcoming barriers-utilization. Mutation breeding: mutation – types – mutagens – breeding procedure – applications – achievements – limitations. Somaclonal variation - utilization in crop improvement; *In vitro* selection techniques — Use of doubled haploids in crop improvement. Introduction to markers – morphological – biochemical- DNA markers – uses of marker assisted selection - major genes – merits – demerits – achievements.

Unit V: Maintenance breeding

Types of cultivars – procedure for release of new varieties – stages in seed multiplication – seed certification and TC plants certification. Maintenance Breeding: General seed production techniques – steps in nucleus and breeder seed production – varietal rundown and renovation. Breeding for biotic and abiotic stresses; Current trends in Plant Breeding- Marker assisted breeding -Transgenic crops - Varietal protection and geographical indications – DUS.

Practical

Observation on reproductive and pollination systems in plants – Alternation of generation and life cycle – Description and drawing of different pollination systems – Mechanisms enforcing self and cross pollination – Morphology of pollen grains – Assessment of pollen fertility and sterility in A, B, and R line – Maintenance of A, B lines. Emasculation technique – Selfing and crossing techniques – Breeder kit – Layout of different trails – Irradiation – dosimetry – Half life period – Procedure for irradiation – Chemical mutagenesis – Molar solution – Procedure for treatment – Calculation of heterosis, PCV, GCV, heritability, genetic advance – genetic divergence – Records maintained – Wild species maintenance and utilization - screening method for specific traits – marker assisted selection.

References

1. Singh, B.D. 2005. Plant breeding - Principles and methods. Kalyani Publishers, New Delhi.
2. Phundhan Singh. 2001. Essentials of plant breeding, Kalyani publishers, New Delhi.
3. Daniel Sundararaj, G. Thulasidas and M. Stephen Dorairaj. 1997. Introduction to Cytogenetics and Plant Breeding. Popular Book Depot. Chennai – 15.

Further reading

1. Chopra, V. L., 1994. Plant breeding theory and practice. Oxford and IBH Publishing Co. Pvt. Ltd.
2. Sharma, J. R. 1994. Principles and practice of plant breeding Tata McGraw-Hill publishing Co., New Delhi.
3. Allard, R. 1989. Principles of plant breeding. John Wiley and Sons, New Delhi.
4. Russell, G. E. 1985. Progress in Plant Breeding. Butter Worths, England.
5. Chaudhary, H. K. 1980. Elementary principles of plant breeding. Oxford and IBH publication Co., New Delhi.

Web resources

1. http://en.wikipedia.org/wiki/Plant_breeding
2. <http://www.edugreen.teri.res.in/explore/bio/breed.htm>
3. <http://cuke.hort.ncsu.edu/gpb/>
4. <http://www.stumbleupon.com/tag/plant-breeding/>
5. <http://www.iaea.org/>

Theory schedule

1. Objectives and role of plant breeding - historical perspective – activities in Plant Breeding.
2. Centres of origin – contribution of Vavilov, Harlan, Zhukovosky – law of homologous series.
3. Plant genetic resources – importance – germplasm – types – activities – gene erosion - gene bank – collection - conservation – types of conservation – agencies – quarantine.
4. Germplasm: evaluation – use of descriptors, documentation, utilization; Agencies – national and international; germplasm exchange – quarantine.
5. Modes of reproduction – sexual – asexual - self and cross fertilization – significance of pollination.
6. Self incompatibility – classifications – mechanisms – application – measures to overcome and limitations.
7. Sterility – male sterility – introduction – classification – CMS,GMS,CGMS -inheritance and applications.
8. TGMS, PGMS, Gametocides, Transgenic Male sterility and applications.
9. Apomixis – introduction - classification-applications; Parthenocarpy and its types.
10. Basic biometrics-nature and significance of qualitative and quantitative variation-phenotypic, genotypic and environmental-heritability and genetic advance
11. Plant introduction as a breeding method – types of introduction – objectives – quarantine - acclimatization – achievements - merits and demerits.
12. Genetic basis of self pollinated crops – Vilmorin principle of progeny selection - Johanssen's pure line theory.
13. Breeding methods for self pollinated crops without involving artificial hybridization: Pure line selection – procedure – merits and demerits – achievements; Mass selection in self pollinated crops – procedure - types – comparison of mass and pureline selection – achievements.
14. Breeding methods of self pollinated crops involving artificial hybridization: Creating variability in self pollinated crops - Hybridization and selection – objectives types – choice of parents – combining ability - combination breeding and transgressive breeding – steps in hybridization - kinds of emasculation.
15. Pedigree breeding – procedure – mass pedigree – merits – demerits – achievements; Bulk breeding – procedure – merits – demerits – achievements.
16. Comparison of pedigree and bulk breeding methods. Single Seed Descent (SSD) method – procedure – application – merits and demerits.

17. Mid Semester Examination

18. Backcross breeding – genetic principles – prerequisites – procedures for transferring dominant and recessive genes.
19. Back cross breeding – merits – demerits – multi lines and multi blends - population improvement approach in self-pollinated crops.
20. Genetic structure of a population in cross pollinated crop – Hardy Weinberg law – gene frequencies in random mating population – principles in population improvement.
21. Breeding methods of cross pollinated crops without involving artificial hybridization: Mass selection in cross pollinated crops – modified mass selection – unit selection – mass selection with progeny testing – half sib family selection – full sib family selection.
22. Breeding methods of cross pollinated crops involving artificial hybridization: Recurrent selection principles – types – merits and demerits.
23. Heterosis breeding – genetic basis – hybrid vigour – estimation of heterosis – inbreeding depression – development of inbreds.
24. Heterosis breeding – procedure – use of male-sterility systems and manual emasculation in hybrid seed production – maintenance of parental lines -types of hybrids – achievements – merits and demerits.
25. Synthetics and composites - steps in development of synthetics and composites – achievements – merits and demerits.

26. Genetic characters of asexual reproduction – breeding methods – clonal selection – hybridization and clonal selection – merits and demerits – achievements; Chimeras and its types; Tree breeding – clonal orchards.
27. Polyploidy breeding – classification – induction of polyploidy – diploid x tetraploid and diploid x hexaploid crosses - achievements – limitations.
28. Wide hybridization-history-importance-barriers and techniques for overcoming barriers-utilization
29. Mutation breeding: mutation – types – mutagens – breeding procedure – applications – achievements – limitations.
30. Somaclonal variation - utilization in crop improvement; *In vitro* selection techniques — Use of doubled haploids in crop improvement.
31. Introduction to markers – morphological – biochemical- DNA markers – uses of marker assisted selection - major genes – merits – demerits – achievements.
32. Types of cultivars – procedure for release of new varieties – stages in seed multiplication – seed certification and TC plants certification.
33. Maintenance Breeding: General seed production techniques – steps in nucleus and breeder seed production – varietal rundown and renovation.
34. Breeding for biotic and abiotic stresses; Current trends in Plant Breeding - Marker assisted breeding -Transgenic crops - Varietal protection and geographical indications – DUS.

Practical schedule

1. Pollination and reproduction in plants - Alternation of generation and life cycle.
2. Description and drawing different pollination systems - Mechanisms enforcing self and cross pollination in crops; Pollen morphology - Exine structure of different crops. Fertility and sterility in A, B, R and TGMS lines.
3. Breeder kit and its components – uses; Basic steps of selfing and crossing techniques.
4. Emasculation and pollination techniques in field crops.
5. Emasculation and pollination techniques in horticultural crops.
6. Studies on segregating generations and maintenance of records.
7. Maintenance of A, B and R line and TGMS lines - Hybrid seed production techniques
8. Estimation of heterosis.
9. Induction of polyploidy using colchicine.
10. Studies on different wild species in crop plants and wide hybridization.
11. Irradiation - dosimetry - half life period - procedure for irradiation of seeds and planting materials. Chemical mutagenesis - molar solution preparation - procedure for chemical mutagenesis of seeds and planting materials.
12. Germplasm preservation – conservation - records maintained in research stations
13. Calculation of PCV, GCV, heritability, genetic advance, genetic divergence
14. Layout of different yield trials - Observing the experimental plots; Visit to nucleus and breeder seed production plots.
15. Screening methods – laboratory and field – for biotic and abiotic stresses.
16. Procedure for marker assisted selection.
- 17. Final Practical Examination.**

HOR 312 Production Technology of Flower Crops, Medicinal and Aromatic Crops 2+1

Theory

Unit I: Scope, importance, production and post harvest technology of commercial flower crops

Importance, scope, constraints and future prospects – area and production – floriculture industry - export potential of commercial flowers – protected cultivation of - Loose flowers - Soil and climate – varieties – propagation – nursery practices – planting methods – pinching, training and pruning - nutrient and water management – role of growth regulators – harvest–post-harvest management – grading and packaging of rose, jasmine, chrysanthemum, tuberose, crossandra and marigold.

Unit II: Production and post harvest technology of cutflowers

Cut flowers - soil and climate - varieties –propagation – nursery practices – planting methods – special practices – nutrient, water and weed management - fertigation – role of growth regulators – harvest - post harvest management – grading and packaging – export standards of cut rose, gladiolus, carnation, cut chrysanthemum, gerbera, anthurium and tropical orchids.

Unit III: Landscape gardening and lawn making

Ornamental Horticulture – importance of gardening – Designing garden – components of gardening – basic principles of landscaping – Lawn and Lawn making – use of important trees, shrubs and climbers – annuals – biennials and herbaceous perennials in gardening.

Unit IV: Production technology of medicinal crops

Medicinal crops- importance and scope – current status - *ex-situ* and *in-situ* conservation – GAP and organic production and certification - soil and climate – varieties – propagation–planting methods – nutrient, water and weed management – harvest – post-harvest handling – storage, packaging of senna, periwinkle, glory lily, ashwagandha, medicinal coleus, aloe, Isabgol, phyllanthus, medicinal dioscorea and medicinal solanum – extraction of secondary metabolites.

Unit V: Production technology of aromatic crops

Aromatic crops - importance and scope – current status - *ex-situ* and *in-situ* conservation – GAP and organic production and certification - soil and climate – varieties – propagation–planting methods – nutrient, water and weed management – harvest – post-harvest handling – storage, packaging of ocimum, davana, mint, lemon grass, citronella, geranium, eucalyptus, palmarosa and vetiver – distillation of essential oils.

Practical

Identification of varieties-propagation-special practices- nutrient management and disorders in rose, jasmine, crossandra, chrysanthemum, marigold, tuberose, cut rose, gladiolus, carnation, gerbera, anthurium and tropical orchids – visit to commercial floricultural units / floral oil extraction units and flower markets. Study of various components of garden – Lawn and Lawn making – identification of important trees – shrubs, creepers, annuals, biennials and herbaceous perennials used in gardening. Identification of varieties-propagation-special practices - nutrient management, processing of medicinal and aromatic crops - senna, periwinkle, glory lily, ashwagandha, phyllanthus, medicinal coleus, aloe, medicinal dioscorea, medicinal solanum, ocimum, davana, mint, lemon grass, citronella, geranium, eucalyptus, palmarosa and vetiver – visit to commercial medicinal and aromatic plants fields and processing units

References

1. Bhattacharjee, S.K and De L.C (2003) Advanced Commercial Floriculture Vol. (1) Aavishkar publishers, Distributors, Jaipur.
2. Bhattacharjee, S.K and De L.C (2005) Medicinal Herbs & Flowers, Aarishkar, Jaipur.
3. Bhattacharjee, S.K., 2004. Hand book of medicinal plants, Pointer publications, Jaipur.
4. Bose, T.K., Yadav, L.P., Pal. P., Parthasarathy, V.A., Das. P., 2003. Commercial flowers. Vol. I and II. Naya udyog, Kolkata-6.
5. Ravindrasharma (2004) Agro techniques of Medicinal plants. Daya publishing, New Delhi.
6. Trivedi, P.C. (2004) Medicinal Plants: Utilization and Conservation, Aavishkar Publisher, Distributors, Jaipur.
7. Allan M. Armitage and Judy M. Laushman “Speciality Cut Flowers” , Second Edition, Published by Timber press 2003, ISBN - 0881925799
8. Atal. C. K. and B. M. Kapur. 1992. Cultivation and utilisation of medicinal plants RRL. CSIR, Jammu – Tawi.
9. Bose, T.K., Yadav, L.P., Pal. P., Das. P. and Parthasarathy, V.A., (2002) Commercial Flowers. Vol.1, Naya Prakash, Calcutta.
10. Chadha, K.L.1994. Advances in Horticulture, Vol.10. Malhotra Publishing house, New Delhi.
11. Chadha, K.L.1994. Advances in Horticulture, Vol.11. Malhotra Publishing house, New Delhi.
12. Farooqi, M., M. M. Khan and M. Vasundhara. 2004. Production technology of medicinal and aromatic crops. Natural Remedies Pvt. Ltd., Bangalore – 561229.
13. Surendraprasad and Updesh Kumar (1998), Commercial floriculture, Agrobotanica, Bikaner.
14. Kumar, N. Introduction to Horticulture. 2010. Oxford and IBH Publications, New Delhi.
15. Kumar, N. Introduction to Spices, Plantation, Medicinal and Aromatic crops. 1995. Oxford and IBH Publications, New Delhi.

Journals

1. Amruth
2. Journal of Medicinal and Aromatic Plants

Web resources

1. <http://www.theflowerexport.com>
2. <http://www.intuxford.tripod.com>
3. <http://www.webct.uark.edu>
4. <http://www.pubmed.com>
5. <http://www.bestgarden.net/>
6. <http://www.indiaagronet.com/>
7. <http://www.intuxford.tripod.com/>
8. <http://www.lawngrasses.com/>
9. <http://www.frlht.org>
10. www.herbs.org
11. www.nmpb.nic.in

Theory schedule

1. Importance, scope and future prospects - area and production and commercial floriculture industry
2. Export potential of commercial flowers.
3. Protected cultivation – Importance and constraints in flower production
4. Rose - varieties - soil and climate - planting-pruning methods-special horticultural practices - nutritional management - role of growth regulators-harvesting– post harvest management – grading and packing
5. Jasmine – varieties - soil and climate-planting-pruning methods - nutritional management-irrigation and weed management pressing - harvesting –post harvest handling – grading and packing.
6. Chrysanthemum – varieties - soil and climate -planting- pinching and disbudding - nutritional management-irrigation and weed management - harvesting –post harvest handling – grading and packaging
7. Tuberose – varieties - soil and climate - planting-nutritional management-irrigation and weed management-harvesting –post harvest handling – grading and packing
8. Crossandra – varieties - soil and climate- planting-nutritional management-irrigation and weed management-harvesting –post harvest handling – grading and packing
9. Marigold - varieties - soil and climate - planting-nutritional management-irrigation and weed management-harvesting–post harvest handling – grading and packing
10. Cut rose - varieties - soil and climate - planting-pruning methods – nutrient and water - harvesting – yield – post harvest handling–grading and packing
11. Gladiolus – varieties - soil and climate- planting-nutritional management-irrigation and weed management-harvesting – post harvest handling – grading and packing
12. Carnation – varieties - soil and climate-planting-nutritional and water management-harvesting – post harvest handling – grading and packing
13. Cut Chrysanthemum - varieties - soil and climate-planting-nutrient management-irrigation - harvesting– post harvest handling – grading and packing
14. Gerbera – varieties - soil and climate-planting-nutrient and water management-harvesting– post harvest handling – grading and packing
15. Anthurium and Tropical orchids – varieties - soil and climate - planting-nutrient management-irrigation -harvesting –post harvest handling – grading and packing
16. Scope and Importance of medicinal & aromatic crops– current status - conservation methods
17. **Mid Semester Examination.**
18. Importance of gardening and designing a garden
19. Components of garden and basic principles of landscaping
20. Lawn and Lawn making
21. Important trees, shrubs and climbers used in ornamental gardening
22. Annuals, biennials and herbaceous perennials used in ornamental gardening.
23. GAP and organic production of medicinal and aromatic crops and certification
24. Senna, periwinkle - varieties – soil and climate – propagation- sowing and planting, nutrient, water and weed management - harvest, and processing – post harvest handling
25. Ashwagandha - varieties –soil and climate – propagation - sowing and planting, nutrient, water and weed management – harvest, and processing – post harvest handling
26. Medicinal coleus, aloe - soil and climate – propagation - planting, nutrient, water and weed management – harvest, yield and processing – post harvest handling
27. Gloriosa and Isabgol - Propagation- soil and climate – propagation and planting- standards - pollination-nutrient, water and weed management – harvest, yield and processing – post harvest handling
28. Medicinal Solanum and Medicinal Dioscorea - varieties - soil and climate – propagation - sowing, nutrient, water and weed – harvest, yield and processing – post harvest handling.
29. Methods of extraction of secondary metabolites from medicinal plants
30. Ocimum, davana and Mint - varieties – soil and climate- propagation - planting - nutrient, water and weed management – harvest, distillation of essential oil

31. Citronella, Lemon grass and Vetiver - varieties – soil and climate propagation - planting – nutrient, water and weed management – harvest- distillation of essential oil.
32. Geranium and Palmarosa - varieties – soil and climate propagation - planting - nutrient, water and weed management – harvest- distillation of essential oil.
33. Eucalyptus- species and varieties – soil and climate propagation - planting - nutrient, water and weed management – Special practices-harvest- distillation of essential oil.
34. Methods of distillation of essential oil from aromatic crops

Practical schedule

1. Identification and description of varieties in rose, jasmine and chrysanthemum.
2. Identification and description of varieties of crossandra, marigold and tuberose.
3. Identification and description of varieties of cut rose, anthurium, carnation and gerbera.
4. Media preparation and potting of cut flowers
5. Study of various components of garden
6. Lawn and lawn making
7. Identification of important trees, shrubs and creepers used in garden.
8. Identification of important annuals, biennials and herbaceous perennials used in garden.
9. Identification of medicinal and aromatic plants – study on economic parts used and their products
10. Propagation techniques of senna and periwinkle, glory lily, aswagandha and phyllanthus.
11. Propagation techniques of medicinal coleus, isabgol and aloe.
12. Propagation techniques of medicinal Dioscorea, and Solanum
13. Identification of species/varieties and propagation techniques of ocimum, eucalyptus, davana and mint.
14. Identification of varieties and propagation techniques of lemon grass, palmarosa, vetiver, citronella and geranium
15. Visit to commercial floriculture and floral oil extraction units
16. Visit to commercial medicinal and aromatic crops field and extraction unit.
17. **Final Practical Examination.**

AEX 301 Extension Methodologies and Transfer of Agricultural Technology 1+1

Theory

Unit I: Communication and Programme Planning

Communication – meaning – definition – models – elements and their characteristics – types and barriers in communication. Programme planning – meaning, definition, principles, steps in programme development process, monitoring and evaluation of extension programmes.

Unit II: Extension Teaching Methods

Extension teaching methods - Audio-Visual aids – definition – classification – purpose, planning and selection, combination and use – individual, group and mass contact methods – merits and demerits.

Unit III: Modern Communication Gadgets

Modern communication sources – internet, video and teleconferencing, Interactive Multimedia Compact Disk (IMCD), village kiosks, Kissan Call Centre (KCC), mobile phone

Unit IV: Diffusion and Adoption

Diffusion – meaning and elements. Adoption – meaning –adopter categories and factors influencing adoption, stages of adoption, Innovation decision process and attributes of innovation consequences of adoption.

Unit V: Capacity building

Capacity building of extension personnel and farmers – meaning – definition, types of training, training to farmers, farm women and rural youth, FTC & KVK.

Practical

Communication pattern in TOT organizations – ongoing agricultural and rural development/TOT programmes, ATMA and SHGs – preparation of visual aids – extension literature – news stories, feature stories – interview articles – photo journalism – activities of Directorate of ODL / Educational Media Centre – activities of Community Radio Centre – writing script for radio and television – spread and acceptance of farm technologies at village level.

References

1. Ray, G.L., 1999. Extension Communication and Management, Naya Prokash, 206, Bidhan Sarani, Calcutta.
2. Rogers, E.M. 1995. Diffusion of Innovations, The Free Press, Newyork
3. Sandhu, A.S. 1996. Extension Programme Planning, Oxford & IBH Publishing Co. pvt. Ltd, New Delhi
4. Sandhu, A.S. 1996. Agricultural Communication: Process and Methods, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

Journals

1. Indian Journal of Social Sciences, Serials Publications, New Delhi
2. Agricultural Extension Review, Department of Agriculture and Co-operation, Ministry of Agriculture, New Delhi
3. Journal of Rural Development, NIRD, Rajendra Nagar, Hyderabad
4. MANAGE, NAARM, Hyderabad
5. Yojana, Ministry of Rural Development, New Delhi

Web resources

1. www.i4d.com
2. www.panasia.org
3. www.joe.org

Theory schedule

1. Communication-meaning, definition, functions, elements and their characteristics.
2. Types and barriers of communication and models of communication.
3. Programme planning-definition, scope, principles, importance, steps, evaluation, keys for evaluation.
4. Extension teaching methods-definition, meaning, functions, selection and classification.
5. Individual contact methods-farm and home visit, office call, telephone call and personal letter-observation and result demonstration.
6. Group contact methods-method demonstration, meeting, lecture, debate, workshop, seminar, forum and conference
7. Group contact methods-symposium, panel, brainstorming, buzz session, role playing and simulation games.
8. Mass contact methods-campaign, exhibition, farmers day and field trips - purpose, procedures, advantages and limitations.
9. **Mid Semester Examination.**
10. Mass contact methods-written communication-circular letter, leaflet, folder, pamphlet-purpose, procedures, advantages and limitations.
11. Audio visual aids-definition, scope and importance, classification-merits and demerits-factors influencing planning and selection.
12. Modern communication gadgets-computer networks, internet, video and teleconferencing.
13. Modern communication sources (e-extension)-multimedia devices-mobile phone, Kisan Call Centre, Village Knowledge Centre/information kiosks, portal, websites.
14. Diffusion-meaning, definition, elements. Innovation-adoption, meaning, definition, attributes of innovation and stages of adoption
15. Innovation-decision process, functions, adopter categories-factors influencing adoption-impact and constraints in technology transfer programmes.
16. Capacity building of extension personnel and farmers-meaning, definition and importance
17. Training-types, institutions training for farmers, farm women and rural youths and importance

Practical schedule

1. Understanding the communication pattern in State Department of Agriculture/Horticulture.
2. Study on communication pattern in University TOT Centres.
3. Study of on going agricultural development programmes.
4. Preparation and practicing of posters, charts, graphs, circular letter, folders and leaflets
5. Visit to the State Department of Agricultural Engineering to study the transfer of technology efforts in farm mechanization.
6. Visit to village and fixing the priorities and selecting a most important problem for preparation of a project.
7. Visit to ATMA implemented village.
8. Studying the role of print media communication in publishing the activities of agriculture and allied fields.
9. Visit to Educational Media Centre.
10. Practicing skill on photo journalism
11. Studying the distance learning efforts of Directorate of ODL/Educational Media Centre
12. Studying the role of Community Radio Centre in TOT
13. Script writing for Radio and Television
14. Preparation of interview schedule to study the spread and acceptance of farm technologies at village level.
15. Data collection and tabulation
16. Presentation of reports.
17. **Final Practical Examination**

Theory

Unit I: Agricultural Marketing – Nature and Scope

Market and Marketing: definitions, components and dimensions of a market. Agricultural Marketing: Concepts and definitions, scope and subject matter. Classification of markets. Role of market functionaries - market forces and price determination. Marketing of agricultural Vs manufactured goods. Producer surplus of agricultural commodities: Definition, producer surplus. Marketable and Marketed surplus: Definition, importance and factors affecting marketable surplus.

Unit II: Marketing Functions and SCP Paradigm

Marketing functions: buying and selling- packaging and transportation --grading and standardization--storage and warehousing -- processing and value addition. Market Structure--Conduct--Performance paradigm (SCP) – Market Structure meaning, components, dynamics of conduct and performance.

Unit III: Marketing Efficiency and Marketing Institutions

Marketing channels: definition and channels for different products. Market integration: definition and types. Marketing efficiency: meaning and definition. Marketing costs, margins and price spread. Factors affecting marketing costs. Reasons for higher marketing costs. Ways of reducing marketing costs. Concepts of Supply Chain Management and value enhancement. Marketing of agricultural inputs. Role and Objectives of marketing institutions: State and Central-objectives -Cooperatives, Commodity groups, State trading, Ware housing, FCI, PDS, - Quality Control, AGMARK.

Unit IV: Trade in Agricultural Products

Theories of Trade: Absolute and Comparative Advantage - Status of Agricultural exports/ imports from India and their share. Barriers to trade – tariff and non tariff measures. Role of institutions like UNCTAD and WTO in promoting trade in agricultural products. Free Trade Agreements -Implications of AoA- Market access, Domestic support and export subsidies. New EXIM policy of India – Advantages of AEZs. – Export promotion organization: APEDA, MPEDA, NHB, Commodity boards .

Unit V: Agricultural Prices and Risk Analysis

Price characteristics of agricultural products. Objectives of price policy – Role of CACP – Concept of MSP, FRP (SMP) & SAP. Risk in marketing - meaning and importance- types of risk- speculation and hedging - futures trading – Role of Contract farming in risk mitigation.

Practical

Farm Survey-Preparation of survey schedules- Farmers' marketing practices- Regulated market and its role in marketing of farm produce- Cooperative marketing society -- Farmers' Market- Estimation of marketed and marketable surplus- Identification of marketing channels-Price spread estimation for agricultural / horticultural / livestock products-Role of Food Corporation of India (FCI)/Civil Supplies Corporation in Marketing of Agricultural Produce-Central Warehousing Corporation (CWC) / State Warehousing Corporation (SWC) and their role in storage of farm produce – Functions of NAFED and TANFED - Agmark Laboratory/Grading institutions-Commodity Boards- Export oriented units- Analyzing the implications of trade liberalization-Time series analysis of prices - trend and seasonal variations, cyclical and irregular variations -Index numbers.

References

1. Acharya S.S. and N.L.Agarwal, 2002. Agricultural Marketing in India, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Acharya S.S. and N.L.Agarwal,1994 Agricultural Prices - analysis and policy, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Kahlon A.S. and S.D.Tyagi, 2000. Agricultural Price Policy in India – Allied Publishers Pvt. Ltd., Bombay.
4. Sak Onkvisit. John J.Shaw.1999 International Marketing Analysis and Strategy, Prentice Hall of India, New Delhi.
5. Sivarama Prasad A., 1999. Agricultural Marketing in India - Mittal Publications, New Delhi.
6. Kohls R.L. and N. Uhl. Joseph, 1980. Marketing of Agricultural Products, Collier Macmillan, New York.

Theory schedule

1. Market -definitions-components-dimensions. Agricultural Marketing- definition – scope and subject matter. Classification of market and approaches to the study of marketing - functional, institutional, commodity, behavioral system.
2. Market functionaries and market forces. Marketing of agricultural Vs manufactured goods. Characteristics of agricultural and horticultural commodities in relation to marketing.
3. Producer surplus of agricultural commodities: Definition and types of producer surplus. Marketable and marketed surplus- importance and relationship - factors affecting marketable surplus.
4. Marketing functions- buying and selling- packaging and transportation –grading and standardization--storage and warehousing -- processing and value addition
5. Market SCP paradigm. Market Structure, Conduct & Performance - definitions-components and their dynamics
6. Marketing channel -definition-channels for different products. Marketing costs, margins and price spread - concepts- importance-factors affecting cost of marketing. Reasons for higher marketing costs. Ways of reducing marketing costs.
7. Marketing efficiency-operational and pricing. Market integration-vertical, horizontal and conglomeration.
8. Factor market--marketing of various agricultural inputs-channel of distribution- Input market promotional activities by firm.

9. Mid Semester Examination

10. Role of Government in promoting agricultural marketing viz., regulated markets, cooperative markets and farmers markets. Advantages of modern marketing system over traditional agricultural marketing system .
11. Directorate of Marketing and Inspection – AGMARK - grading and quality control. NAFED and TANFED, State Agricultural Marketing Boards, and FCI. Activities of National Horticultural Board, NDDDB and Commodity Boards.
12. Legal measures for improving agricultural marketing- APMC Act. Supply Chain Management for agricultural commodities and value enhancement.
13. Absolute and comparative advantage trade theories – Concepts of Domestic trade, Free trade and International trade. Share of agricultural commodities in total trade. Major exports and imports of agricultural and Agri-allied commodities.
14. Institutions for promoting trade in agricultural commodities – national and international- GATT, UNCTAD and WTO. Agreement on Agriculture – Market access, Domestic Support and Export subsidy.
15. New EXIM policy of India - Role of Agri. Export Zones – Export promotion Councils – APEDA, MPEDA and ITPO.
16. Agricultural Prices - function and scope - price characteristics of agricultural products. Food policy and prices -Procurement of food grains- buffer stock. Role of administered prices – MSP, SMP & SAP.
17. Risk in marketing - types of risk- speculation and hedging. Price risk – futures trading. Forward Vs Futures market. Role of Contract farming in risk management.

Practical schedule

1. Farm Survey-Preparation of survey schedules for collection of data.
2. Farm visit to collect information on marketing practices of agricultural commodities and marketing problems.
3. Visit to weekly shandy/vegetable market/ farmers market.
4. Regulated market and its role in marketing of farm produce – field visit.
5. A visit to Cooperative marketing society to study the services and marketing of farm produce.
6. Visit to Wholesale market/ commission mundy.
7. Estimation of marketable and marketed surplus

8. Price spread estimation for major agricultural and agri-allied products
9. Estimation of marketing efficiency and market integration
10. Visit to FCI/ CSC
11. CWC/ SWC and their role in storage of farm produce.
12. Agmark Laboratory/Grading institutions-visit.
13. Marketing of farm inputs - visit to farm input dealer
14. Visit to commodity boards/ AEZ/Export oriented Units.
15. Time series analysis of prices - TCSI variations.
16. Index number-construction and uses.
17. **Final Practical Examination.**

ENG 301 Soft Skills for Employability 0+1

Unit I:

Soft skills and hard skills – career skills and corporate skills – lateral thinking - ego styles – different types – on being a professional.

Unit II:

1. Attitude

Psychological and Sociological definitions – types of attitude (positive and negative) and consequences – suggestions to keep a good attitude.

2. Emotional Intelligence (EI)

Introduction and Definitions – four branch model of EQ and its detailed explanation - five point scale to measure EI – suggestions to improve EI

3. Interpersonal skills

Study of character traits - discussion of formal interpersonal skills like greeting, enquiring, answering, complimenting and acknowledging.

4. Self Development/Empowerment

Self awareness and motivation – Maslow's theory of hierarchy and needs - Self analysis through SWOC and Johari Window – Elements and seven rules of motivation – Goal setting based on principle of SMART – Strategies of self motivation – Knowledge enhancing through reading of Newspapers, magazines and journals.

Unit III: Communication Skills

5. Process of communication

Objectives of communication – Types of communication – Formal Vs informal communication – LSRW components of communication – Barriers to communication

6. Listening skills

Purpose and significance of listening – Process of listening –Different types of listening - How to be a good listener – Guidelines for effective listening – Barriers to listening – Tips to overcome the barriers

7. Reading skills

Purpose and significance of Reading – Benefits of reading – Process/Types of reading – Understanding/Inferring/Note making – SQ3R technique –How to be a good reader – Barriers/Distractions to good reading – Tips to overcome the barriers

8. Speaking Skills

Purpose and significance of speaking clearly –Verbal code and visual code - Benefits of good speaking - Process/ components of good speech – Informative speaking & its types – persuasive speaking & its types –Presentation skills – Barriers of speaking - Tips to overcome the barriers

9. Writing skills

Purpose and significance of writing – features of good writing – How to develop writing skills – choice construction, paragraph design, etc. – letter writing skills – formal & informal – parts of a good letter – layout & format of a letter –preparing a curriculum vitae – report writing – preparing a conference paper – writing a book review - editing – punctuation, spelling, grammar and vocabulary.

10. Telephone skills

The right environment – formal greetings - telephone courtesies – effective listening skills – interpersonal skills – concluding formality.

11. Mid Semester Examination

UNIT IV: Employability Skills

12. Interview skills - I

Definitions of interview – two types of group interview – preliminary requirements for success – telephone interview – specially designed interviews.

13. Interview skills - II

Five stages of interview – how to answer the questions

14. Group discussion

Definition – contexts – why and how? – techniques for successful participation – skills required – simulation – based - group discussion.

UNIT V: Corporate Skills

15. Leadership qualities

Definition - basic requirements – (responsibility - self – knowledge - knowledge of, and rapport with subordinates- knowledge of the assignment- goal setting- decision making – team work) leadership with primates – leadership and vision.

16. Negotiation skills

Select definitions – functions of negotiation – two kinds of negotiation – phases of the process – rules – steps to improve negotiation skills.

17. Time management

Basic skills of time management – relationship between stress management and time management – time management techniques for prudent time management – tips for time management.

Stress management

Definition of stress –kinds - stress at work – causes, effects and solution - stress and stroke –different kinds of stroke – stress in interview.

PRACTICAL SESSIONS

Session No.	Title	Activity
1.	Soft Skills- an overview	Brainstorming session
2.	Life skills/ Attitude	Interactive software and discussion pm [positive thinking
3.	Interpersonal skills	Demonstration
4.	Self Development/Empowerment role-play	Role-play
5.	Process of communication	Interactive software Effective Communication
6.	Listening and speaking	Audio listening and close tasks

7.	Reading and writing Skills	Reading an unfamiliar text writing simulation
8.	Presentation Skills.	Listening to a software and demonstration by students and peer group evaluation
9.	Professional writing strategies	Discussion on article scientific and conference paper by means of handouts
10.	Writing a rejoinder	Divergent simulation
11.	Group discussion	Audio listening on group discussion and structured, timed Group Discussion.
12.	Interview skills – I	Listening to software on being interviewed and preparing a resume
13.	Interview skills - II	Interview simulation by subject experts and the course teacher
14.	Leadership qualities	Brainstorming session and convergent simulations
15.	Negotiation skills	Role Play
16.	Stress management and time management listening	To a software on stress and role play

References

1. Hariharan,S. , S. N. Sundararajan, and S.P.Shanmugapriya.(2010). **Soft Skills**. MJP Publishers, Chennai.
2. Alex. (2009). Soft skills: Know yourself and know the world. S. Chand & Co. Publishing House, New Delhi.
3. Beverly Jaeger. (2004). Making Work Work for the Highly Sensitive Person. Tata McGraw – Hill, USA.
4. Dipali Biswas. (2009). Enhancing Soft Skills. Shoraff Publishers and Distributors.
5. Gloria. J. Galanes, Kathreine Adams, John. K. and Brillhart. (2004). Effective Group Discussion. Tata McGraw – Hill, New Delhi.
6. Jagadeesan. G. and Santhanakrishnan, R. (2007). Soft Skills Development. ICFAI University Press. New Delhi.
7. Martin Avis. (2010). Effective Time Management Skills for Everyone. Avis Consultancy, London, U.K.
8. Mayer, J.D., Salovey, P and Caruso, D.R. (2000). Models of Emotional Intelligence. R.J. Shernberg (Ed.). Handbook of Intelligence. Cambridge University Press, Cambridge.
9. Patsy McCarthy and Caroline Hatcher. (2002). Presentation Skill: The Essential Guide for Students. Sage Publications, CA.
10. Peggy Claus. (2007): The Hard Truth about Soft Skills. Harper Collins Publishers, New York, USA.
11. Peter. J. Gosling. (2002), Scientists Guide to Poster Presentations, Kluwar Academic Pub, N.Y, USA.
12. Richard Ellis. (2009). Communication Skills; Step ladders to success for professionals. Intellect Books, Chicago, USA.
13. Robert, A. Day. (2000). How to Write a Scientific Paper. ELBS, U.K.
14. Sarvesh Gulati. (2006). Corporate Soft Skills. Rupa Publishers, New Delhi.
15. Soleman. D. (1998). Working with Emotional Intelligence Bloomsbury Publishing, London.

Web resources

1. www.softskills.com
2. www.reportingskills.com
3. www.writing-skills.com
4. www.negotiation.com
5. www.businessballs.com
6. www.study-habits.com
7. www.timethoughts.com

Course code & Title: **SAC 302 Soil Resource Inventory and Problem Soils 2+1**

Date			Practical Schedule
A	B	C	
			1. Profile description
			2. Study of base maps – topo-sheets and cadastral maps
			3. Aerial photographs and satellite imagery interpretation
			4. Estimation of lime requirement of acid soil
			5. Estimation of CEC in sodic soil part I
			6. Estimation of CEC in sodic soil part II
			7. Estimation of Exchangeable cations and working out ESP
			8. Estimation of gypsum requirement of sodic soil
			9. Land suitability for field crops, horticultural crops and forest trees
			10. Estimation of pH, EC, TSS and chloride in irrigation water
			11. Estimation of carbonate and bicarbonate in irrigation water
			12. Estimation of sulphate in irrigation water by turbidimetry
			13. Estimation of calcium and magnesium in irrigation water
			14. Estimation of sodium and potassium in irrigation water
			15. Classification of irrigation waters as per USSL and other systems
			16. Field visit to problem soils area and soil survey unit

Course code & Title: **PBG 301 Principles and Methods of Plant Breeding 2+1**

Date			Practical Schedule
A	B	C	
			1. Pollination and reproduction in plants - Alternation of generation and life cycle.
			2. Description and drawing different pollination systems - Mechanisms enforcing self and cross pollination in crops; Pollen morphology - Exine structure of different crops. Fertility and sterility in A, B, R and TGMS lines.
			3. Breeder kit and its components – uses; Basic steps of selfing and crossing techniques.
			4. Emasculation and pollination techniques in field crops.
			5. Emasculation and pollination techniques in horticultural crops.
			6. Studies on segregating generations and maintenance of records.
			7. Maintenance of A, B and R line and TGMS lines - Hybrid seed production techniques
			8. Estimation of heterosis.
			9. Induction of polyploidy using colchicine.
			10. Studies on different wild species in crop plants and wide hybridization.
			11. Irradiation - dosimetry - half life period - procedure for irradiation of seeds and planting materials. Chemical mutagenesis - molar solution preparation - procedure for chemical mutagenesis of seeds and planting materials.
			12. Germplasm preservation – conservation - records maintained in research stations
			13. Calculation of PCV, GCV, heritability, genetic advance, genetic divergence
			14. Layout of different yield trials - Observing the experimental plots; Visit to nucleus and breeder seed production plots.
			15. Screening methods – laboratory and field – for biotic and abiotic stresses.
			16. Procedure for marker assisted selection.

Course code & Title: **HOR 312 Production Technology of Flower Crops, Medicinal & Aromatic Crops 2+1**

Date			Practical Schedule
A	B	C	
			1. Identification and description of varieties in rose, jasmine and chrysanthemum.
			2. Identification and description of varieties of crossandra, marigold and tuberose.
			3. Identification and description of varieties of cut rose, anthurium, carnation and gerbera.
			4. Media preparation and potting of cut flowers
			5. Study of various components of garden
			6. Lawn and lawn making
			7. Identification of important trees, shrubs and creepers used in garden.
			8. Identification of important annuals, biennials and herbaceous perennials used in garden.
			9. Identification of medicinal and aromatic plants – study on economic parts used and their products
			10. Propagation techniques of senna and periwinkle, glory lily, aswagandha and phyllanthus.
			11. Propagation techniques of medicinal coleus, isabgol and aloe.
			12. Propagation techniques of medicinal Dioscorea, and Solanum
			13. Identification of species/varieties and propagation techniques of ocimum, eucalyptus, davana and mint.
			14. Identification of varieties and propagation techniques of lemon grass, palmarosa, vetiver, citronella and geranium
			15. Visit to commercial floriculture and floral oil extraction units
			16. Visit to commercial medicinal and aromatic crops field and extraction unit.