

Guidelines on

IMPLEMENTATION OF THE RECOMMENDATION

OF

VI DEANS' COMMITTEE REPORT OF ICAR

from

I SEMESTER 2024-25

with

THE START OF CLASS

from

October 1, 2024

B. Sc. (Hons.) Agriculture

School of Agriculture Science, Technology & Research

SARDAR PATEL UNIVERSITY BALAGHAT (M. P.)

Course distribution for I and II Semester of the First Year

B. Sc. (Hons.) Agriculture

S. No.	Course Title	Credit Hours	Total credit hours
I Semester			
1	Induction cum Foundation course (<i>Deekshaarambh</i>) Non-gradial	1 week 2 (0+2) NG	21 (11+10)
2	Skill Enhancement Course-I (Organic production technology)	2 (0+2)	
3	Skill Enhancement Course-II (Horticulture nursery management)	2 (0+2)	
4	Communication skills	2 (1+1)	
5	Farming based livelihood systems	3 (2+1)	
6	Rural sociology and educational psychology	2 (2+0)	
7	Fundamentals of agronomy	3 (2+1)	
8	Fundamentals of soil science	3 (2+1)	
9	Fundamentals of horticulture	3 (2+1)	
10	National Cadet Corps (NCC-I) / National Service Scheme (NSS-I)	1 (0+1)	
11	Introductory mathematics (need based) Non-gradial	1 (1+0) NG	
II Semester			
1	Skill Enhancement course-III (Mushroom production technology)	2 (0+2)	21 (10+11)
2	Skill Enhancement course-IV (Commercial beekeeping)	2 (0+2)	
3	Personality Development	2 (1+1)	
4	Environmental Studies and Disaster Management	3 (2+1)	
5	Soil Fertility Management	3 (2+1)	
6	Fundamentals of Entomology	3 (2+1)	
7	Livestock and Poultry Management	2 (1+1)	
8	Fundamentals of Plant Pathology	3 (2+1)	
9	National Cadet Corps (NCC-II) / National Service Scheme (NSS-II)	1 (0+1)	
10	Online course (Compulsory minimum 10 credits during whole degree program)		
Minimum Required (do not include Online courses)			

I Year I Semester

1.

Course Code: ICFC101P

Course Title: Induction cum Foundation course (*Deekshaarambh*) Non-gradual

Credit Hours 2 (0+2)

Objective:

- Help for cultural integration of students from different backgrounds,
- Know about the operational framework of academic process in the University/College/Institute
- Instilling life and social skills
- Social Awareness, Ethics and Values, Team Work, Leadership, Creativity, etc.
- Identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario.
- Identify strength and weakness of the students in different core areas of the discipline.

The details of activities will be decided by the parent universities. The structure shall include, but not restricted to:

- I. Discussions on operational framework of academic process in the University, as well as interactions with academic and research managers of the University
- II. Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences
- III. Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences
- IV. iv. Activities to enhance cultural Integration of students from different backgrounds.
- V. Field visits to related fields/ establishments
- VI. Sessions on personality development (instilling life and social skills, social awareness, ethics and values, team work, leadership, etc.) and communication skills

2.

Course Code: SEC-I P

Course Title: Skill Enhancement Course-I (Organic production technology)

Credit Hours: 2 (0+2)

Objective:

- To study identify the principles of organic farming and recognize its benefits over conventional farming, as well as evaluate the current status and scope for organic agriculture at local, national, and global levels.
- To study learn about organic farming techniques, including soil preparation, crop rotation, water management, and contamination control, and apply these to design an organic farm layout with appropriate buffer zones. Gain Knowledge of Organic Certification and Marketing.
- To study will acquire hands-on knowledge in using organic nutrients (e.g., composting, bio-fertilizers) and organic pest management techniques, such as botanical pesticides, eco-friendly traps, and bio-control methods, with a focus on sustainable farming practices.

Practical

UNIT-I

Organic farming and present status and development; principles of organic farming: benefits and scope of organic farming. Chemical farming vs organic farming. Organic Production Technology. International, National and State norms of organic farming. Farm designing, Planning and layout of organic farm, Buffer zone. Land preparation, tillage, Choice of crops and varieties, Seed treatment and planting, Water management and Contamination Control. Crop rotation, cropping pattern and cropping systems, intercropping, Farming system, Integrated farming system, Livestock management in organic farming, Farm implement.

UNIT-II

Indigenous Technical Knowledge. Initiatives taken by the central and state governments, NGOs and other organizations for promotion of organic agriculture in India. Nutrient use in organic farming, Residue recycling: Preparation of enriched farm yard manure, Preparation of different methods of composting viz, Indore method, Bangalore methods, Coimbatore method and NADEP method, Vermicompost, Application of compost, Different methods of bio-fertilizers (Azatobacter, Azospirillum, Azolla, BGA, Rhizobium, PSB and VAM) application in various crops. Preparation and application of liquid manures viz. Vermi wash, Jeevamrit, Panchagavya, Amrit pani etc.

UNIT-III

Fundamentals of insect, disease and weed management under organic mode of production-cultural, mechanical and biological methods-non chemical pest & disease management. Mulching: types, advantages, Identification of beneficial farm insect, Botanical pesticide preparation of Neem products and other botanicals for pest and disease control viz. Neemastra,

Agnishtra, Brahmanastra Beejamrit, Deshparni Ark Jeevamrata, Panchgavya, Amritpani, etc. Importance of cow in organic farming. Collection and processing of cow products (ghee, milk, curd, urin dung) for making Bioformulations. Use of eco-friendly insect management techniques viz. Pheronone trap, light trap, yellow cards, bird perch etc. for monitoring and insect management purpose, Dose calculation and application method of bio-pesticides viz. Trichogramma, Pseudomonas, Fusarium, Bacillus thuringiensis, Methizium and Beauvaria bassnia; Ha- NPV and SL-NPV etc. Myco-herbicides

UNIT-IV

Visit of organic farm and field based organic experiments to study the various components, Visit to organic clusters and bio control lab to study the maintenance of biofertilizers / bio-inoculant cultures, Case studies of Indigenous Technical knowledge (ITK) for nutrient, insect, pest, disease and weed management.

UNIT-V

Organic certification- Requirement, guidelines, agencies, registration, documentation, advantages and procedure of organic certification, Visit to organic certification agencies for understating certification procedure. Various Current Government schemes related to organic farming. Crop production standards, Quality consideration- labelling and accreditation procedures for organic products, Marketing Strategies of organic produces - past experiences and future prospects, import and export polices, requirements for export, agencies involved in export of organic produce and incentives for organic production & geo-tagging. Start-Ups and Funding Avenues in Organic farming.

Suggested readings:

1. Organic Food Production in India Status, Strategy and Scope Bhattacharya, P. 2003, Agribios (India), Jodhpur
2. Organic Farming-Theory and Practices Palanniappan, S.P. and Anandurai, K 1999, Scientific Publisher, Jodhpur
3. Organic Farming Lumpkin, N. 1990, Farming Press Books, IPSWITCH, U.K.
4. Hand Book of Organic Farming Sharma, A.K. 2001, Agribios (India), Jodhpur
5. Organic Farming Gupta, M.K. 200, Moraka Foundation, jodhpur
6. Organic Farming for Sustainable Horticulturen Parvatha Reddy, P, Agribios (India), Jodhpur
7. Emerging Trends in Biological Control of Phytophageous insects AnanthakrishnanT.N. 1992, Oxford & IBH, New Delhi

3.

Course Code: SEC-II P

Course Title: Skill Enhancement Course-II (Horticulture nursery management)

Credit Hours: 2 (0+2)

Objective:

- To provide students with a comprehensive understanding of nursery establishment, layout and management practices.
- To develop skills in propagation techniques and the production of quality planting material.
- To educate students on pest and disease management and the economic aspects of nursery development.

Practical:

Unit I

Introduction, Seedling supply chain; Nursery – Definition, its role, importance and types of nursery; Guidelines for nursery raising, Components of a good nursery, nursery layout, nursery inputs and its management; Preparation of nursery beds, Media for propagation of plants in nursery beds and sowing of seeds, Use of different types of tools and implements

Unit II

Plant propagation structures, Preparation of plant material for potting and repotting, assessment of quality seedlings; Bureau of Indian Standards (BIS-2008) related to nursery; Quality propagules production; Good practices of fruit collection, seed extraction and storage. Seed dormancy: Definition, various classification of seed dormancy, Seed treatments for breaking seed dormancy.

Unit III

Sexual and asexual plant propagation; Cuttings, Grafting, budding, air-layering, micro-propagation; Hardening off plants in nursery; Common possible errors in nursery activities; Rooting media

Unit IV

Nursery technology for some important tree species; Nursery diseases and their management; Nursery pests and their management; Watering, weeding and nutrient management in nursery; Types and use of PGR, Preparation and application of plant growth regulator solutions for seed germination and vegetative propagation of different crops.

Unit V

Planning and scheduling nursery activities, maintenance of nursery records; Examples of successful model nurseries; Economics of nursery development; Record management; Online nursery information and sales systems; Live plant library at nursery: An awareness concept

Suggested readings:

1. Chadha, K.L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.
2. Chundawat, B.S. 1990. Arid fruit culture. Oxford and IBH, New Delhi.
3. Guy W. Adriance and Feed R. Brison. Propagation of Horticultural Plants. Axis Books (India).
4. Hartman, H. T and Kester, D.E.1976.Plant Propagation Principles and practices. Prentice hall of India Pvt. Ltd., Bombay.
5. Hudson T. Hartmann, Dale E. Kester, Fred T. Davies, Jr. and Robert L. Geneve. Plant Propagation- Principles and Practices (7th Edition). PHI Learning Private Limited, New Delhi-110001
6. S. Rajan and B. L. Markose (series editor Prof. K.V. Peter). Propagation of Horticultural Crops- Horticulture Science Series vol.6. New India Publishing Agency, Pitam Pura, New Delhi-110088.
7. Sarma, R.R.2002. Propagation of Horticultural Crops. Kalyani Publishers, (Principles and practices) New Delhi.
8. T.K. Bose, S.K. Mitra, M.K. Sadhu, P. Das and D. Sanyal. Propagation of Tropical & Subtropical Horticultural Crops, Volume 1(3rd Revised edition). Naya Udyog, 206, Bidhan Sarani, Kolkata 700006.

4.

Course Code: AEC101T

Course Title: Communication Skills

Credit Hours 2 (1+1)

Objective:

To acquire competence in oral, written and non-verbal communication, develop strong personal and professional communication and demonstrate positive group communication.

Theory

Unit I

Communication Process: The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning, types and models of communication; Verbal and non-verbal communication; Linguistic and non-linguistic barriers to communication and reasons behind communication gap/miscommunication.

Unit II

Basic Communication Skills: Listening, Speaking, Reading and Writing Skills; Precis writing/ Abstracting/Summarizing; Style of technical communication Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions.

Unit III

Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbal; phrases and clauses.

Unit IV

Case: subjective case, possessive case; objective case; Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles; Agreement of verb with the subject: tense, mood, voice.

Unit V

Writing effective sentences; Basic sentence faults.

Practical (AEC101P)

1. Listening and note taking.
2. Writing skills: precis writing, summarizing and abstracting.
3. Reading and comprehension (written and oral) of general and technical articles.
4. Micro-presentations and Impromptu Presentations: Feedback on presentations.
5. Stage manners: grooming, body language, voice modulation, speed.
6. Group discussions; Public speaking exercises; vocabulary building exercises.
7. Interview Techniques; organization of events.

Suggested readings:

1. Allport, G. W. 1937. Personality: A Psychological Interpretation. Holt, New York.
2. Brown Michele and Gyles Brandreth. 1994. How to Interview and be Interviewed. Sheldon Press, London.
3. Carnegie Dale. 1997. The Quick and Easy Way to Effective Speaking. Pocket Books, New York.
4. Francis Peter S J. 2012. Soft Skills and Professional Communication. Tata McGraw Hill, New Delhi.
5. Kumar S and Pushpa Lata. 2011. Communication Skills. Oxford University Press.
6. Neuliep James W. 2003. Intercultural Communication A Contextual Approach. Houghton Mifflin Co Boston.
7. Pease, Allan. 1998. Body Language. Sudha Publications, Delhi.
8. Raman M and Singh P. 2000. Business Communication. Oxford University Press.
9. Seely J. 2013. Oxford Guide to Effective Writing and Speaking. Oxford University Press.
10. Thomson A J and Martinet A V. 1977. A Practical English Grammar. Oxford University.

5.

Course Code: MDC101T

Course Title: Farming based livelihood systems

Credit Hours 3 (2+1)

Objective:

1. To make the students aware about farming-based livelihood systems in agriculture
2. To disseminate the knowledge and skill how farming-based systems can be a source of livelihood

Theory

UNIT-I

Status of agriculture in India and different states, Income of farmers and rural people in India, Livelihood-Definition, concept and livelihood pattern in urban and rural areas, Different indicators to study livelihood systems.

UNIT-II

Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework, Definition of farming systems and farming based livelihood systems Prevalent Farming systems in India contributing to livelihood.

UNIT-III

Types of traditional and modern farming systems. Components of farming system/ farming-based livelihood systems- Crops and cropping systems, Livestock (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro--forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc., small, medium and large enterprises including value chains and secondary enterprises as livelihood components for farmers, Factors affecting integration of various enterprises of farming for livelihood.

UNIT-IV

Feasibility of different farming systems for different agro-climatic zones, Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country, Case studies on different livelihood enterprises associated with the farming.

UNIT-V

Risk and success factors in farming-based livelihood systems, Schemes and programs by Central and State Government, Public and Private organizations involved in promotion of farming-based livelihood opportunities. Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing life style.

Practical (MDC101P)

1. Survey of farming systems and agricultural-based livelihood enterprises,
2. Study of components of important farming-based livelihood models/ systems in different agro-climatic zones,
3. Study of production and profitability of crop based, livestock based, processing based and integrated farming based livelihood models,
4. Field visit of innovative farming system models.
5. Visit of agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors.
6. Study of agri-enterprises involved in industry and service sectors (Value Chain Models),
7. Learning about concept of project formulation on farming-based livelihood systems along with cost and profit analysis,
8. Case study of Start-Ups in agri-sectors.

Suggested Readings:

1. Ashley, C. and Carney, D. 1999. Sustainable Livelihoods: Lessons from Early Experience; Department for International Development: London, UK; Volume 7. [Google Scholar]
2. Agarwal, A. and Narain, S. 1989. Towards Green Villages: A strategy for Environmentally, Sound and Participatory Rural Development, Center for Science and Environment, New Delhi, India

3. Carloni, A. 2001. Global Farming Systems Study: Challenges and Priorities to 2030 – Regional Analysis: Sub-Saharan Africa, Consultation Document, FAO, Rome, Italy
4. Dixon, J. and A. Gulliver with D. Gibbon. 2001. Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO & World Bank, Rome, Italy & Washington, DC, USA
5. Evenson, R.E. 2000. Agricultural Productivity and Production in Developing Countries'. In FAO, The State of Food and Agriculture, FAO, Rome, Italy
6. Livelihood Improvement of Underprivileged Farming Community: Some Experiences from Vaishali, Samastipur, Darbhanga and Munger Districts of Bihar by B. P. Bhatt, Abhay Kumar, P.K. Thakur, AmitavaDeyUjjwal Kumar, Sanjeev Kumar, B.K. Jha, Lokendra Kumar, K. N. Pathak, A. Hassan, S. K. Singh, K. K. Singh and K. M. Singh ICAR Research Complex for Eastern Region ICAR Parisar, P.O. Bihar Veterinary College, Patna - 800 014, Bihar
7. Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification, Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.
8. Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.
9. Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram.
10. Walia, S. S. and Walia, U. S. 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.

6.

Course Code: CC104T

Course Title: Rural Sociology and Educational Psychology

Credit Hours: 2 (2+0)

Objective:

Provide knowledge on concept and importance of sociology and rural sociology as well as the relationship with Extension Education

Theory

Unit I

Extension Education and Agricultural Extension: Meaning, definition, scope, and importance. Sociology and rural sociology: Meaning, definition, scope, importance of rural sociology in Agricultural Extension, and interrelationship between rural sociology and Agricultural Extension. Indian Rural Society: important characteristics, differences and relationship between rural and urban societies.

Unit II

Social Groups: Meaning, definition, classification, factors considered information and organization of groups, motivation in group formation and role of social groups in Agricultural Extension. Social Stratification: Meaning, definition, functions, basis for stratification, forms of social stratification- characteristics and- differences between class and caste system.

Unit III

Cultural concepts: culture, customs, folkways, mores, taboos, rituals. Traditions: Meaning, definition and their role in Agricultural Extension. Social Values and Attitudes: Meaning, definition, types and role of social values and attitudes in agricultural Extension. Social Institutions: Meaning, definition, major institutions in rural society, functions, and their role in agricultural Extension. Social Organizations: Meaning, definition, types of organizations and role of social organizations in agricultural Extension.

Unit IV

Social Control: Meaning, definition, need of social control and means of social control. Social change: Meaning, definition, nature of social change, dimensions of social change and factors of social change. Leadership: Meaning, definition, classification, roles of leader, different methods of selection of professional and lay leaders. Training of Leaders: Meaning, definition, methods of training, Advantages and limitations in use of local leaders in Agricultural Extension.

Unit V

Psychology and educational psychology: Meaning, definition, scope, and importance of educational psychology in Agricultural Extension. Intelligence: Meaning, definition, types, factors affecting intelligence and importance of intelligence in Agricultural Extension. Personality: Meaning, definition, types, factors influencing the personality and role of personality in agricultural Extension. Teaching: Learning process: Meaning and definition of teaching, learning, learning experience and learning situation, elements of learning situation and its characteristics. Principles of learning and their implication of teaching.

Suggested readings:

1. A. R. Desai -Rural Sociology in India
2. Dahama O. P. and Bhatnagar, O. P. - Education and Communication for Development
3. J.B. Chitambar -Introductory Rural Sociology
4. M.B. Ghorpade- Essential of psychology
5. Prepared You Tube videos
6. R Velusamy Textbook on Rural Sociology and Educational Psychology
7. Ray, G. L. -Extension Communication and Management
8. Sandhu A. S. -Textbook on Agricultural Communication
9. Web Materials

7.

Course Code: CC101T

Course Title: Fundamentals of Agronomy

Credit Hours 3 (2 +1)

Objective:

To impart the basic and fundamental knowledge of Agronomy

Theory

UNIT-I

Agronomy and its scope: Definition, meaning and scope of Agronomy; art, science and business of crop production, relation of Agronomy with other disciplines of Agricultural Science, fields crops and classification, importance, ecology and ecosystem. Seeds and sowing: Definitions of crops, variety and seed. Factors affecting crop stands establishment: good quality seed, proper tillage, time of sowing seed rate, depth and method of sowing: broadcasting, drilling, dibbling, transplanting etc.

UNIT-II

Tillage and tilth: Definition, objectives, types, advantages and disadvantages of tillage including conservation tillage. Crop density and geometry: plant geometry and planting geometry, its effect on growth, yield. Crop nutrition: Definition of essential nutrients, criteria of essentiality, functional elements, classification of essential nutrients, role of macro and micro nutrients. Nutrient absorption, active and passive absorption of nutrients, forms of plant nutrients absorbed by plants, Combined /uncombined forms.

UNIT-III

Manures and fertilizers, nutrient use efficiency: Sources of nutrients: Inorganic (fertilizers), organic (manures) and bio-fertilizers; their classification and characteristics, method of preparation and role of organic manures in crop production. Integrated Nutrient Management (INM): Meaning, different approaches and advantages of INM.

UNIT-IV

Green manure- role in crop production: Definition, objectives types of green manuring, desirable characteristics, advantages and limitations of green manuring. Water management: Water resources of the world, India and the state; Soil Moisture constants: gravitational water, capillary water, hygroscopic water, Soil moisture constants. Weeds: Definition, Importance and basics of

classification of weeds and their control. Agroclimatic zones of India and the state, cropping systems: Factors affecting cropping systems, major cropping patterns and systems in the country.

UNIT-V

Sustainable crop production: Definition, importance and practices, natural resources and conservation pollution and pollutants, Allelopathy: Meaning and importance in crop production, Growth and development of crops: Definition, Meaning and factors affecting growth and development.

Practical (CC101P)

- 1 A visit to Instructional Crop farm and study on field crops,
- 2 Identification of crops, seeds, fertilizers, pesticides,
- 3 Crops and cropping systems in different Agro-climatic zones of the state,
- 4 Study of some preparatory tillage implements,
- 5 Study of inter tillage implements, Practice of ploughing / puddling,
- 6 Study and practice of inter cultivation in field crops,
- 7 Numerical exercises on calculation of seed, plant population and fertilizer requirement,
- 8 Study of yield contributing characters and yield estimation of crops,
- 9 Identification of weeds in different crops,
- 10 Seed germination and viability test of seed,
- 11 Practice on time and method of application of manures and fertilizers.

Suggested readings:

1. Rao V S. 1992. Principles of Weed Science. Oxford and IBH Publishing Co. Ltd. New Delhi.
2. Reddy Yellamanda T and Shankar Reddy G H. 1995. Principles of Agronomy. Kalyani Publishers, Ludhiana.
3. Reddy, S. R. 2008. Principle of Crop Production, Kalyani Publisher, Ludhiana.
4. William L Donn. 1965. Meteorology. McGraw-Hill Book Co. New York.
5. Yawalkar K S and Agarwal J P. 1977. Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur.

8.

Course Code: CC103T

Course Title: Fundamentals of Soil Science

Credit Hours 3 (2+1)

Objective:

To impart knowledge on soil genesis, basic soil properties with respect to plant growth

Theory

Unit – I

Soil: Pedological and edaphological concepts. Rocks and minerals, weathering.

Unit – II

Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation (after buffering capacity).

Unit – III

Soil formation, Soil organic matter, Pedogenic processes, Soil colloids: inorganic and organic, Properties of soil colloids and Ion exchange in soils.

Unit – IV

Soil profile, soil texture, soil structure. Bulk density and particle density, soil consistency, soil temperature, soil air, soil water.

Unit – V

Soil reaction and buffering capacity. Soil taxonomy, keys to soil orders. Soils of India.

Practical (CC103P)

1. Study of general properties of minerals,
2. Study of minerals-silicate and non-silicate minerals,
3. Study of rocks-igneous, sedimentary and metamorphic rocks;
4. Study of a soil profile, collection and processing of soil for analysis,
5. Study of soil texture-feel method, mechanical analysis,
6. Determination particle density and soil porosity,
7. Determination of soil colour,
8. Study of soil structure and aggregate analysis,
9. Determination of soil moisture,

10. Determination of soil moisture constants- field capacity; water holding capacity.
11. Study of infiltration rate of soil,
12. Determination of pH and Electrical conductivity of soil.

Suggested readings:

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

9.

Course Code: CC102T

Course Title: Fundamentals of Horticulture

Credit Hours 3 (2+1)

Objective:

1. To provide knowledge on different branches of horticulture viz. pomology, olericulture, floriculture and landscaping, spices and medicinal plants
2. To provide knowledge on orchard management, propagation methods, cultural operations and nutrient management of horticultural crops
3. To provide knowledge on different physiological aspects of horticultural crops

Theory

Unit I

Horticulture: Its different branches, importance and scope, Horticulture and botanical classification, soil and climate for horticultural crops.

Unit II

Plant propagation: methods and propagation structures, seed dormancy and seed germination, Merits and demerits of sexual and asexual propagation Stock-scion relationship.

Unit III

Principles of orchard establishment, principles and methods of training and pruning of fruit crops.

Unit IV

Juvenility and flower bud differentiation, unfruitfulness in horticultural crops, pollination, pollinizers and pollinators, fertilization and parthenocarpy.

Unit V

Importance of bio regulators in horticultural crops, irrigation and its methods, Fertilizer application in horticultural crops.

Practical (CC102P)

1. Identification and nomenclature of fruit
2. Layout of an orchard
3. pit making and system of planting

4. Nursery raising techniques of fruit crops
5. Understanding of plant propagation structures
6. Propagation through seeds and plant parts
7. Propagation techniques for horticultural crops
8. Container, potting mixture, potting and repotting
9. Training and pruning methods on fruit crops
10. Preparation of fertilizer mixture and application
11. Layout of different irrigation systems
12. Maturity studies, harvesting, grading, packaging and storage.
13. Preparation and application of PGR.

Suggested readings

1. Basics of Horticulture by Jitendra Singh
2. Introduction to Horticulture by N. Kumar
3. Handbook of Horticulture by ICAR

10.

Course Code: AEC102P

Course Title: National Cadet Corps-I (NCC-I) / National Service Scheme-I (NSS-I)

Credit Hours 1 (0+1)

National Cadet Corps-I (NCC-I)

Practical

As per government guidelines, for getting B and C certificate in NCC, minimum years of requirement is 2 and 3 years along with 1-2 annual camps

- Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
- Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
- Sizing, numbering, forming in three ranks, open and close order march, and dressing.
- Saluting at the halt, getting on parade, dismissing, and falling out.
- Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear. Turning on the march and wheeling. Saluting on the march.
- Marking time, forward march, and halt. Changing step, formation of squad and squad drill.
- Command and control, organization, badges of rank, honors, and awards.
- Nation Building- cultural heritage, religions, traditions, and customs of India. National integration. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizens. Leadership traits, types of leadership. Character/ personality development. Civil defense organization, types of emergencies, firefighting, protection. Maintenance of essential services, disaster management, aid during development projects.
- Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
- Structure and function of human body, diet and exercise, hygiene and sanitation. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health. Adventure activities. Basic principles of ecology, environmental conservation, pollution and its control.

Suggested readings:

- NCC : Handbook of NCC Cadets for "A", "B" and "C" Certificate Examination by RPH Editorial Board
- A Concise Handbook of NCC Cadets for A, B and C Certificate by RPH Editorial Board

- Cadet Hand Book (Army Wing) by Major R.C. Mishra
- Cadet Hand Book (Army Wing) by Directorate General, NCC, Ministry of Defence, R.K. Puram, New Delhi

National Service Scheme-I (NSS-I)

Practical

Evoking social consciousness among students through various activities viz., working together, constructive, and creative social work, to be skilful in executing democratic leadership, developing skill in programme, to be able to seek self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

All the activities related to the National Service Scheme are distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme III and National Service Scheme IV; each having one credit load.

The entire four courses should be offered continuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than five regular one-day camp in a year and one special camp for duration of 7 days at any semester break period in the two years. Different activities will include orientation lectures and practical works. Activities directed by the Central and State Government have to be performed by all the volunteers of NSS as per direction.

Introduction and Basic Components of NSS

- Orientation: history, objectives, principles, symbol, badge; regular programs under NSS
- Organizational structure of NSS, Code of conduct for NSS volunteers, points to be considered by NSS volunteers' awareness about health.
- NSS program activities: Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analyzing guiding financial patterns of scheme, youth program/ schemes of GOI, coordination with different agencies and maintenance of diary. Understanding youth. Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change.
- Community mobilization: Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilization involving youth-adult partnership. Social harmony and national integration.
- Indian history and culture, role of youth in nation building, conflict resolution and peacebuilding. Volunteerism and shramdaan. Indian tradition of volunteerism, its need, importance, motivation, and constraints; shaman as part of volunteerism.

- Citizenship, constitution, and human rights: Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information. Family and society. Concept of family, community (PRIs and other communitybased organizations) and society.

Suggested readings:

- NSS volunteer diary – by NSS unit Rani Durgawati Vishwa Vidyalaya, Jabalpur
- Guideline of NSS - Empanelled Training Institute, Barkatullah University, NSS Bhopal
- Social thought- by Ravindra Nath Mukerji, Publisher- Vivek Prakashan Delhi
- Communication and Extension Management- by Dr. Jitendra Chouhan , Publisher- Kushal publications & distribution Varanasi
- Extension Communication and Management- by G.L.Ray, Publisher- Kalyni publishers, New Delhi
- Indian philosophy - by Basantlal, Publisher- Motilal Barsidas, New Delhi
- Text book of Entrepreneurship and Rural development - by Sagar Mandal & G.L.Ray Publisher- Kalyni publishers, New Delhi
- Extension Education and Rural development - by Santh Govind, G. Tamilselvi & J. Meenambi gai, Publisher- Agrobios (India)
- Awaking India- Swami Vivekananda- by Ramkrishan Mission, New Delhi, Publisher- Mayur printers & publishers, New Delhi

11.

Course Code: RC101T

Course Title: Introductory Mathematics (Non-gradual)

Credit Hours 1 (1+0)

Objective:

1. To Understand basic mathematical concepts
2. Developing Problem-Solving Skills in students
3. Enhancing Computational Proficiency

Theory

UNIT-I

Algebra: Progressions- Arithmetic, Geometric and Harmonic Progressions.

UNIT-II

Matrices: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order by adjoint method, Properties of determinants up to 3rd order and their evaluation.

UNIT-III

Differential Calculus: Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions, Methods, Increasing and Decreasing Functions. Application of Differentiation- Growth rate, Average Cost, and Marginal cost, Marginal Revenue. Partial differentiation: Homogeneous function, Euler's theorem, Maxima and Minima of the functions of the form $y = f(x)$ and $y = f(x_1, x_2)$.

UNIT-IV

Integral Calculus: Integration -Definite and Indefinite Integrals-Methods- Integration by substitution, Integration by parts. Area under simple well-known curves.

UNIT-V

Mathematical Models: Agricultural systems - Mathematical models - classification of mathematical models- Fitting of Linear, quadratic and exponential models to experimental data.

Suggested readings:

1. Agricultural Mathematics by R. Singh; Alok Kansal, Meerut Aman publication house.
2. A Text Book of Matrices by Shanti Narayan, S. Chand publication.

3. Calculus by Gilbert strang, Wellesley Cambridge Press.
4. Mathematics for Agriculture by Betty C. Rogers, 2nd Editions.

I Year II Semester

1.

Course Code: SEC-III P

Course Title: Skill Enhancement course-III (Mushroom production technology)

Credit Hours 2 (0+2)

Practical

1. Mushroom Diversity: Edible, Poisonous, mycorrhizal and medicinal mushrooms
2. Identification, taxonomy and characterization of mushrooms
3. Global status of mushroom spawn and crop production and its export from India
4. Mushroom cultivation & research in India
5. Medicinal and nutraceutical attributes of mushroom
6. Acquaintance with different instruments used in mushroom spawn production
7. Pure culture techniques in mushroom spawn production and strain improvement
8. Preparation of mother and commercial spawn and their maintenance
9. Low cost techniques for spawn production at village level
10. Advances in composting during button mushroom production
11. Commercial production technology of button mushroom
12. Techniques of strain improvement in cultivable mushrooms
13. Seasonal growing of button mushrooms
14. Pipe technology of seasonal button mushroom production and mushroom entrepreneurship
15. Recent advances in the cultivation technology of paddy straw mushroom
16. Cultivation of paddy straw mushroom
17. Post-harvest processing of paddy straw mushroom
18. Milky mushroom production technology
19. Production technology of oyster mushroom
20. Cultivation of Lion's Mane (*Hericium sp.*) and Split gill mushroom (*S. commune*)
21. Specialty mushrooms (Auricularia, Flammulina, Ganoderma): Cultivation prospects
22. Strain improvement and cultivation technology of shiitake mushroom
23. Post-harvest Processing and management of mushrooms
24. Important biotic stresses and their management in mushroom cultivation
25. Recycling of spent mushroom substrate
26. Mushroom recipes and their value-added products
27. Extension approaches for popularization of mushrooms
28. Field visits, interaction and success stories of progressive mushroom growers and women SHGSs in Madhya Pradesh and Chhattisgarh
29. Marketing strategies, Start-Ups and funding avenues in mushroom

2.

Course Code: SEC-IV P

Course Title: Skill Enhancement course-IV (Commercial beekeeping)

Credit Hours 2 (0+2)

Practical

1. Organization of honey bee colony and biological behaviour of different bee species
2. Study of useful bee plants and foraging of bees
3. Essential equipment of bee keeping
4. Factors to be considered for establishing of apiary
5. Artificial rearing of queen
6. Seasonal management of bees
7. Nutritive values, uses and quality control of honey
8. Insect and mite enemies of bees and their management
9. Crop pollination and bee keeping
10. Pesticidal poisoning to honey bees
11. Economic of bee keeping
12. Study of useful bee plants and foraging of bees
13. Acquaintance with bee keeping equipment's and handling of bees
14. Multiplication of bee colony
15. Extraction of honey and bee wax
16. Products of bee hive
17. Ripening of honey and its quality control
18. Production of royal jelly
19. Management of insects and pests of bees
20. Startups of bee products with students and SHGs

Suggested Reading:

1. Singh, S. 1975. Bee keeping in India, ICAR, New Delhi.
2. Sunita, N.D, Guled ,M.B, Mulla S.R and Jagginavar,2003, Beekeeping, UAS Dharwad.
3. Mishra, R.C. and Rajesh Gar. 2002. Prospective in Indian Apiculture. Agrobios, Jodhpur.
4. Singh, D and Singh, D.P. 2006. A hand book of Beekeeping, Agrobios (India).

3.

Course Code: AEC201T

Course Title: Personality Development

Credit Hours 2 (1+1)

Objective:

To make students realize their potential strengths, cultivate their inter-personal skills and improve employability

Theory

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

Motivation- theories and principles, Teamwork and group dynamics.

Practical (AEC201P)

1. MBTI personality analysis.
2. Learning Styles and Strategies.
3. Motivational needs, Firo-B.
4. Interpersonal Communication, Teamwork and team building.

5. Group Dynamics, Win-win game, Conflict Management.
6. Leadership styles.
7. Case studies on Personality and Organizational Behavior.

Suggested reading:

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

4.

Course Code: VAC201T

Course Title: Environmental Studies and Disaster Management

Credit Hours 3 (2+1)

Objective:

To expose and acquire knowledge on the environment and to gain the state-of-the-art - skill and expertise on management of disasters

Theory

Unit-I

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

Unit-II

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

Unit-III

Environmental Pollution: Definition, cause, effects and control measures of: a. Air pollution. b. Water pollution. c. Soil pollution. d. Marine pollution. e. Noise pollution. f. Thermal pollution. h. light pollution. Solid Waste Management: Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, effects and control measures of urban and industrial wastes. Social issues and the Environment: Urban problems related to energy.

Unit-IV

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

Unit-V

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

Practical (VAC201P)

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

Suggested Readings:

1. De, A.K. 2010. Environmental chemistry. Published by New Age International Publishers, New Delhi. ISBN:13-978 81 224 2617 5. 384 pp
2. Dhar Chakrabarti, P.G. 2011. Disaster management - India's risk management policy frameworks and key challenges. Published by Centre for Social Markets (India), Bangalore. 36 pp.
3. Erach Bharucha, Text book for Environmental studies. University Grants Commission, New Delhi
4. Parthiban, K.T. Vennila, Prasanthrajan, S., Umesh, M. and Kanna, S. 2023. Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India. (In Press).
5. Prasanthrajan M. and Mahendran, P.P. 2008. A text book on Ecology and Environmental Science. ISBN 81-8321-104-6. Agrotech Publishing Academy, Udaipur - 313 002. First Edition:
6. Prasanthrajan M. 2018. Objective environmental studies and disaster management. ISBN 9789387893825. Scientific publishers, Jodhpur, India. Pp. 146.
7. Sharma, P.D. 2009. Ecology and Environment, Rastogi Publications, Meerut, India
8. Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage learning publication, Belmont, USA.

5.

Course Code: CC201T

Course Title: Soil Fertility Management

Credit Hours 3 (2+1)

Objective:

To provide a comprehensive knowledge of soil fertility, plant nutrition, fertilizers, and nutrient management

Theory

Unit I

History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Unit II

Chemistry of macro and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Introduction and importance of manures and fertilizers. Fertilizer recommendation approaches.

Unit III

Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major fertilizers, secondary and micronutrient fertilizers, Complex fertilizers, Customised fertilizers, water soluble fertilizers, nano fertilizers and soil amendments.

Unit IV

Fertilizer storage, Fertilizer control order. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Unit V

STCR/RTNM/ IPNS, Carbon sequestration and Carbon Trading, Preparation and properties of major manures (FYM, Compost, Vermicompost, Green manuring, Oilcakes).

Practical (CC201P)

- Introduction of analytical instruments and their principles, calibration and applications of Colometry and flame photometry.
- Estimation of alkaline hydrolysable N in soils.
- Estimation of soil extractable P in soils.

- Estimation of exchangeable K in soils.
- Estimation of exchangeable Ca and Mg in soils.
- Estimation of soil extractable S in soils.
- Estimation of DTPA extractable Zn in soils.
- Estimation of N in plants.
- Estimation of P in plants.
- Estimation of K in plants.
- Estimation of S in plants.

Suggested readings:

1. Introductory Soil Science by Dilip Kumar Das, Kalyani Publishers
2. Soil Fertility and Nutrient Management by S. S. Singh, Kalyani Publishers
3. Soil Fertility and Fertilizers by Samuel L. Tisdale, Werner L. Nelson and James D. Beaton, Macmillan Publishing Company, New York.
4. The nature and Properties of Soils by Harry O. Buckman and Nyle C.

6.

Course Code: CC202T

Course Title: Fundamentals of Entomology

Credit Hours 3(2+1)

Objective:

1. To know the history of entomology, classification of insects and their relationship with other arthropods
2. To study the various morphological characters of class insect and their importance for classification of insects
3. To get an idea about the different physiological systems of insects and their roles in growth and development and communications of insects
4. To study the characteristics of commonly observed insect orders and their economically important families

Theory

Unit I

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda.

Unit II

Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus.

Unit III

Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system in insects. Types of reproduction in insects. Major sensory organs.

Unit IV

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors and biotic factors. Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides.

Unit V

Systematics: Taxonomy – importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Practical (CC202P)

1. Methods of collection and preservation of insects including immature stages legs
2. External features of Grasshopper/Blister beetle
3. Types of insect antennae, mouthparts and legs
4. Wing venation, types of wings and wing coupling apparatus.
5. Types of insect larvae and pupae
6. Dissection of digestive system in insects (Grasshopper)
7. Study of characters of orders. Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.
8. Insecticides and their formulations
9. Pesticide appliances and their maintenance. .
10. Sampling techniques for estimation of insect population and damage.

Suggested readings:

1. Fundamentals of Ecology - Eugene. P. Odum and Gray W. Barrett
2. Imm's General Text book of Entomology— O.W. Rechards and R.G. Davies
3. Introduction to the study of Insects –D. J. Borror and DeLong's

7.

Course Code: CC203T

Course Title: Livestock and poultry Management

Credit Hours 2(1+1)

Objective:

1. Provide basic knowledge to the students about scientific livestock and poultry rearing practices
2. Entrepreneurship development through Livestock/poultry and Agriculture Integrated Farming System

Theory

Unit I

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

Unit II

Management of calves, growing heifers and milch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers.

Unit III

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry. Digestion in livestock and poultry.

Unit IV

Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

Unit V

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical (CC203P)

1. External body parts of cattle, buffalo, sheep, goat, swine and poultry.
2. Handling and restraining of livestock.
3. Identification methods of farm animals and poultry.
4. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm

- operations and farm records.
5. Judging of cattle, buffalo and poultry.
 6. Culling of livestock and poultry.
 7. Planning and layout of housing for different types of livestock.
 8. Computation of rations for livestock.
 9. Formulation of concentrate mixtures.
 10. Clean milk production, milking methods.
 11. Hatchery operations, incubation and hatching equipments.
 12. Management of chicks, growers and layers.
 13. Debeaking, dusting and vaccination.
 14. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Suggested Readings

1. A Textbook of Animal Husbandry by G. C Banerjee
2. A text Book of Livestock Production management in Tropic by D. N. Verma

8.

Course Code: CC204T

Course Title: Fundamentals of Plant Pathology

Credit Hours 3 (2+1)

Objective:

1. To get acquainted with the role of different microorganisms in the development of plant disease
2. To get general concepts and classification of plant diseases
3. To get knowledge of general characteristics of fungi, bacteria, virus, and other microorganisms causing plant diseases
4. To acquaint the students with reproduction in fungi, and bacteria, causing plant diseases
5. To get acquainted with various plant disease management principles and practices

Theory

Unit I

Introduction to Plant Pathology: Concept of disease in plants; Different terms used in Plant Pathology, History of Plant Pathology with special references to India;

Unit II

Causes of plant disease: Inanimate and animate causes. Classification of plant disease; Parasitism and pathogenesis; Development of disease in plants: Disease Triangle, Disease cycle;

Unit III

Fungi and their morphology, reproduction and classification of fungi. Bacteria: Morphology, reproduction classification of phytopathogenic bacteria;

Unit IV

Other plant pathogens: Mollicutes; Flagellant protozoa; FVB; Green algae and parasitic higher plants. Viruses and viroids, virus transmission.

Unit V

Principles of Plant disease management: Disease management with chemicals, Host resistance, cultural and biological method of Integrated Disease Management (IDM).

Practical (CC204)

1. Study of the microscope.
2. Acquaintance with laboratory material and equipment.
3. Study of different plant disease symptoms.
4. Microscopic examination of general structure of fungi.
5. Simple staining of bacteria.
6. Direct and indirect staining.
7. Gram staining of bacteria.
8. Microscopic examination of fungal disease specimen.
9. Microscopic examination of bacterial diseased specimen.
10. Preparation of culture media.
11. Isolation of plant pathogens: Fungi, bacteria and viruses.
12. Purification of plant pathogens.
13. Study on plant disease diagnosis.
14. Koch's Postulates, Characteristics, formulation, methods of application and calculation on fungicides.

Suggested readings:

1. Agrios, G.N. 2010. Plant Pathology. Acad. Press.
2. Alexopoulos, Mims and Blackwel. Introductory Mycology.
3. Dhingra, O.D. and Sinclair, J.B. 1986. Basic Plant Pathology Methods. CRC Press, London, Tokyo.
4. Gibbs, A. and Harrison, B. 1976. Plant Virology - The Principles. Edward Arnold, London
5. Goto, M. 1990. Fundamentals of Plant Bacteriology. Academic Press, New York.
6. Hull R. 2002. Mathew's Plant Virology. 4th edn. Academic Press, New York.
7. Kamat, M. N. Introductory Plant Pathology. Prakash Pub, Jaipur.
8. Mehrotra, R.S. and Aggarwal, A. 2007. Plant Pathology. 7th edn. Tata Mc Graw Hill Publ. Co. Ltd.
9. Nene, Y.L. and Thapliyal, P.N. 1993. Fungicides in Plant Disease Control. 3rd Ed. Oxford & IBH, New Delhi.
10. Pathak, V. N. Essentials of Plant Pathology. Prakash Pub., Jaipur
11. Rajeev, K. and Mukherjee, R.C. 1996. Role of Plant Quarantine in IPM. Aditya Books.
12. Rhower, G.G. 1991. Regulatory Plant Pest Management. In: Handbook of Pest Management in Agriculture. 2nd edn. Vol. II. (Ed. David Pimental). CRC Press.
13. Singh R.S. 2008. Plant Diseases. 8 th Ed. Oxford & IBH. Pub. Co.
14. Singh R.S. 2013. Introduction to Principles of Plant Pathology. Oxford and IBH Pub. Co.
15. Verma, J.P. 1998. The Bacteria. Malhotra Publ. House, New Delhi.
16. Vyas SC. 1993. Handbook of Systemic Fungicides. Vols. I-III. Tata McGraw Hill, New Delhi.

9.

Course Code: AEC202P

Course Title: National Cadet Corps-II (NCC-II) / National Service Scheme (NSS-II)

Credit Hours 1 (0+1)

National Cadet Corps (NCC-II)

Practical

- Arms Drill-Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa. Saluting at the shoulder at the halt and on the march. Short/ long trail from the order and vice- versa. Guard mounting, guard of honor, Platoon/Coy Drill.
- Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting. Loading, cocking, and unloading. The lying position and holding.
- Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing. Characteristics of Carbine and LMG.
- Introduction to map, scales, and conventional signs. Topographical forms and technical terms.
- The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
- Field defenses obstacles, mines and mine lying. Bridging, waterman ship. Field water supplies, tracks and their construction. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment. Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. Types of communication, media, latest trends and developments.

Suggested readings

- NCC : Handbook of NCC Cadets for “A”, “B” and “C” Certificate Examination by RPH Editorial Board
- A Concise Handbook of NCC Cadets for A, B and C Certificate by RPH Editorial Board
- Cadet Hand Book (Army Wing) by Major R.C. Mishra
- Cadet Hand Book (Army Wing) by Directorate General, NCC, Ministry of Defence, R.K. Puram, New Delhi

National Service Scheme-II (NSS-II)

Practical

- Importance and role of youth leadership
- Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership, Life competencies
- Definition and importance of life competencies, problem-solving and decision-making interpersonal communication. Youth development programs
- Development of youth programs and policy at the national level, state level and voluntary sector; youth-focused and youth-led organizations
- Health, hygiene and sanitation. Definition needs and scope of health education; role of food, nutrition, safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programs and reproductive health. Youth health, lifestyle, HIV AIDS and first aid. Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid. Youth and yoga. History, philosophy, concept, myths, and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.

Suggested readings:

- NSS volunteer diary – by NSS unit Rani Durgawati Vishwa Vidyalaya, Jabalpur
- Guideline of NSS - Empanelled Training Institute, Barkatullah University, NSS Bhopal
- Social thought- by Ravindra Nath Mukerji, Publisher- Vivek Prakashan Delhi

- Communication and Extension Management- by Dr. Jitendra Chouhan , Publisher- Kushal publications & distribution Varanasi
- Extension Communication and Management- by G.L.Ray, Publisher- Kalyni publishers, New Delhi
- Indian philosophy - by Basantlal, Publisher- Motilal Barsidas, New Delhi
- Text book of Entrepreneurship and Rural development - by Sagar Mandal & G.L.Ray Publisher- Kalyni publishers, New Delhi
- Extension Education and Rural development - by Santh Govind, G. Tamilselvi & J. Meenambi gai, Publisher- Agrobios (India)
- Awaking India- Swami Vivekananda- by Ramkrishan Mission, New Delhi, Publisher- Mayur printers & publishers, New Delhi

Course distribution for I and II Semester of the Second Year

B. Sc. (Hons.) Agriculture

S. No.	Course Title	Credit Hours	Total credit hours
I Semester			
1	Skill Enhancement course-V (Custom Hiring Services)	2 (0+2)	21 (9+12)
2	Entrepreneurship Development and Business Communication	3 (2+1)	
3	Physical Education, First Aid, Yoga Practices and Meditation	2 (0+2)	
4	Principles of Genetics	3 (2+1)	
5	Crop Production Technology-I (Kharif crops)	3 (1+2)	
6	Production Technology of Fruit and Plantation Crops	2 (1+1)	
7	Fundamentals of Extension Education	2 (1+1)	
8	Fundamentals of Nematology	2 (1+1)	
9	Principles and Practices of Natural Farming	2 (1+1)	
10	Online course (Compulsory minimum 10 credits during whole degree program) Minimum Required (do not include Online courses)	---	
II Semester			
1	Skill Enhancement course-VI	2 (0+2)	
2	Agricultural Informatics and Artificial Intelligence	3 (2+1)	
3	Production Technology of Vegetables and Spices	2 (1+1)	
4	Principles of Agricultural Economics and Farm Management	2 (2+0)	
5	Crop Production Technology-II (Rabi Crops)	3 (1+2)	
6	Farm Machinery and Power	2 (1+1)	
7	Water Management	2 (1+1)	
8	Problematic Soils and their management	2 (1+1)	
9	Basics of Plant Breeding	3 (2+1)	
10	Online course (Compulsory minimum 10 credits during whole degree program) Minimum Required (do not include Online courses)		

II Year I Semester (III Semester)

1.

Course Code: SEC-V P

Course Title: Skill Enhancement course-III (Custom Hiring Services)

Credit Hours 2 (0+2)

Practical

1. Concept of Custom Hiring Centre and Its importance for rural youth
2. Familiarization with different criteria for starting custom Hiring Centers
3. Knowledge of portal and on line application, www.chc.mpdage.org
4. Familiarization with Selection of tractors and knowledge of other matching implements and Machines
5. Familiarization with Cropping Pattern wise selection of farm implement and Machines
6. Familiarization with Region wise selection of farm implement and machines
7. Preparation of project proposal, cost estimation and Breakeven point (BEP) analysis
8. Familiarization with selection of compulsory farm implement and machineries: Tractor (one or two), Plough / Power harrow, Rotavator, Cultivator / disc harrow Seed cum fertilizer drill / tractor operated sowing machine, Tractor operator thresher / straw reaper
9. Introduction with land leveling and ploughing implements(Laser land leveler, Rotary plough, Dodging attachment, Power tiller
10. Introduction with land sowing, planting and transplanting implements (Raised bed planter, Zero tillage seed drill, Garlic planter, Rice transplanter, Vegetable Planter, Potato planter, Sugar cane cutter planter, Multi crop planter, Happy seeder
11. Tractor driving skill, maintenance, repair and servicing schedule
12. Introduction with plant protection implements (Power sprayer, Aero Blast sprayer, Tractor mounted sprayer, Drones)
13. Introduction with crop cutting, Weeding, harvesting and threshing implements (Reaper cum binder, Power Weeder, Potato digger, Axial flow paddy thresher, Tractor mounted reaper, Cotton picker, Straw reaper, Self propelled reaper)
14. Introduction to implements for Post harvest and crop residue management (Maize Sheller -power operated, Cleaner cum grader, Rice mill, Dal mill, Seed grader, Oil extractor, Millet mill, Grinder, Straw lodger, straw Baler and straw reaper)
15. Familiarization with Credit linked Bank Ended Subsidy system

16. Trainings to rural youth for custom hiring centre management, maintenance, record keeping and GPS tracking of Tractors
17. Familiarization with “Mission on Agricultural Mechanization Scheme”
18. Familiarization with Moratorium period
19. Physical verification process and Geo tagging process
20. Knowledge of FARM app , www.dbt.mpdage.org
21. Dangerous Machinery Act

Suggested readings:

1. Jagdiswar Sahay (2020) Elements of Agricultural Engineering 461p, Publ., Standard Publishers Distributers, NewDelhi, ISBN: 9788180140440
2. Jain SC and Rai CR (2021) Farm Tractor and maintenance and repair 462p, Publ., Standard Publishers, Naisarak, Delhi, ISBN- 978-8180142055
3. Ojha TP and Michael AM (1996). Principles of Agricultural Engineering 91p, Publ., Jain brothers, New Delhi, ISBN: 9786609412239
4. Surendra Singh (2020) Farm machinery Principles and applications 700p, Publ., ICAR, New Delhi, ISBN: 9780190640675.
5. www.dbt.mpdage.org and www.chc.mpdage.org

2.

Course Code: MDC301T

Course Title: Entrepreneurship Development and Business Communication

Credit Hours 3 (2+1)

Objective:

1. To provide student an insight into the concept and scope of entrepreneurship
2. To expose the student to various aspects of establishment and management of a small business unit
3. To enable the student to develop financially viable agribusiness proposal

Theory

Unit I

Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies. Concept, need for and importance of entrepreneurial development.

Unit II

Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development, and process of entrepreneurship development.

Unit III

Environment scanning and opportunity identification need for scanning: spotting of opportunity, scanning of environment identification of product / service: starting a project; factors influencing sensing the opportunities. Infrastructure and support systems: good policies, schemes for entrepreneurship development; role of financial institutions, and other agencies in entrepreneurship development.

Unit IV

Steps involved in functioning of an enterprise. Selection of the product / services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution. Planning of an enterprise, project identification, selection, and formulation of project; project report preparation.

Unit V

Enterprise Management. Production management: product, levels of products, product mix, quality control, cost of production, production controls, Material management. Production management: raw material costing, inventory control. Personal management: manpower planning, labour turn over, wages / salaries. Financial management /accounting: funds, fixed capital and working capital, costing and pricing, long term planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement, taxation. Marketing management: market, types, marketing assistance, market strategies. Crisis management: raw material, production, leadership, market, finance, natural etc.

Practical (MDC301P)

1. Visit to small scale industries/agro-industries
2. Interaction with successful entrepreneurs/ agricultrepreneurs.
3. Visit to financial institutions and support agencies.
4. Preparation of project proposal for funding by different agencies.

Suggested Readings:

1. Charantimath, P.M. 2009, Entrepreneurship Development and Small Business Enterprises. Pearson Publications, New Delhi.
2. Desai, V. 2015, Entrepreneurship: Development and Management, Himalaya Publishing House.
3. Gupta, C.B. 2001. Management Theory and Practice. Sultan Chand & Sons.
4. Indu Grover. 2008. Handbook on Empowerment and Entrepreneurship. Agrotech Public Academy.
5. Khanka, S.S. 1999. Entrepreneurial Development. S. Chand & Co.
6. Mehra, P. 2016, Business Communication for Managers. Pearson India, New Delhi.
7. Pandey, M. and Tewari, D. 2010, The Agribusiness Book. IBDC Publishers, Lucknow.
8. Singh, D. 1995. Effective Managerial Leadership. Deep & Deep Publ.
9. Singhal, R.K. 2013, Entrepreneurship Development & Management, Katson Books.
10. Tripathi, P.C. and Reddy, P.N. 1991. Principles of Management. Tata McGraw Hill.
11. Vasant Desai, 1997. Small Scale Industries and Entrepreneurship. Himalaya Publ. House.

3.

Course Code: AEC301P

Course Title: Physical Education, First Aid, Yoga Practices and Meditation

Credit Hours 2 (0+2)

Objective

1. To make the students aware about Physical Education, First Aid and Yoga Practices
2. To disseminate the knowledge and skill how to perform physical training, perform first aid and increase stamina and general wellbeing through yoga

Practical

Unit I

Physical education; Training and Coaching - Meaning and Concept; Methods of Training; aerobic and anaerobic exercises; Calisthenics, weight training, circuit training, interval training, Fartlek training; Effects of Exercise on Muscular, Respiratory, Circulatory and Digestive systems;

Unit II

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

Unit III

Yoga; History of Yog, Types of Yog, Introduction to Yog.

- Asanas (Definition and Importance) Padmasana, Vajrasana, Shashankasana, Pashchimotana, Ushtrasana, Tadasana, Padhasana, Ardhamandukasana, Bhujangasana, Utanpadasana, Sarvangasana, Parvatasana, Patangasana, Shishupalasana – left leg-right leg, Pawanmuktasana, Halasana, Sarpasana, Ardhamandukasana, Sawasana.
- Suryanamskara Pranayama (Definition and Importance) Omkara, Suryabhedana, Chandrabhedana, Anulom Viloma, Shitali, Shitkari, Bhastrika, Bhramari.
- Meditation (Definition and Importance), Yogic Kriyas (Kapalbhati), Tratak, Jalneti and Tribandha.
- Mudras (Definition and Importance) Gyanmudra, Dhyana mudra, Vayumudra, Akashmudra, Pruthvimudra, Shunyamudra, Suryamudra, Varunmudra, Pranmudra, Apanmudra, Vyanmudra, Uddanamudra.
- Role of yoga in sports.
- Teaching of Asanas – demonstration, practice, correction and practice.

Unit IV

History of sports and ancient games, Governance of sports in India; Important national sporting events; Awards in Sports; History, latest rules, measurements of playfield, specifications of equipment, skill, technique, style and coaching of major games (Cricket, football, table Tennis, Badminton, Volleyball, Basketball, Kabaddi and Kho-Kho) and Athletics

Unit V

Need and requirement of first aid. First Aid equipment and upkeep. First aid Techniques, First aid related with Respiratory system. First aid related with Heart, Blood and Circulation. First aid related with Wounds and Injuries. First aid related with Bones, Joints Muscle related injuries. First aid related with Nervous system and Unconsciousness. First aid related with Gastrointestinal Tract. First aid related with Skin, Burns. First aid related with Poisoning. First aid related with Bites and Stings. First aid related with Sense organs, Handling and transport of injured traumatized persons. Sports injuries and their treatments.

4.

Course Code: CC301T

Course Title: Principles of Genetics

Credit Hours 3 (2+1)

Objective

To make the students acquainted with both principles and practices in the areas of classical genetics, modern genetics, quantitative genetics and cytogenetics.

Theory

Unit I

Pre and post Mendelian concepts of heredity, Mendelian principles of heredity, Study of model organisms (*Drosophila*, *Arabidopsis*, Garden pea, *E. coli*, and mice), Architecture of chromosomes, chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere, special types of chromosomes, Chromosomal theory of inheritance.

Unit II

Cell cycle and cell division-mitosis and meiosis. Probability and Chi-square. Types of DNA and RNA, Dominance relationships, Epistatic interactions with example, Introduction and definition of cytology, genetics and cytogenetics and their interrelation.

Unit III

Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanism, chromosome mapping, Structural and numerical variations in chromosomes and their implications.

Unit IV

Use of haploids, dihaploids and double haploids in Genetics, Mutation, classification, Methods of inducing mutations, mutagenic agents and induction of mutation. Qualitative and quantitative traits, Polygenes and continuous variations, multiple factor hypothesis.

Unit V

Cytoplasmic inheritance, Nature, structure and replication of genetic material, Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation.

Practical (CC301P)

1. Study of microscope.
2. Study of cell structure.
3. Mitosis and Meiosis cell division.
4. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross.
5. Experiments on epistatic interactions including test cross and back cross.
6. Practice on mitotic and meiotic cell division.
7. Experiments on probability and chi-square test.
8. Determination of linkage and croo-over analysis (through two point test cross data).
9. Study on sex linked inheritance in *Drosophila*.

10. Study on models on DNA and RNA structures.

Suggested readings:

1. Fundamentals of Genetics: B. D. Singh
2. Genetics: M. W. Strickberger.
3. Principles of Genetics: Gardner, Simmons and Snustad.
4. Principles of Genetics: Sinnott, Dunn and Dobzhansky.

5.

Course Code: CC302T

Course Title: Crop Production Technology-I (*Kharif* crops)

Credit Hours 3 (1+2*)

Objectives:

1. To impart basic and fundamental knowledge on principles and practices of *kharif* crop Production.
2. To impart knowledge and skill on scientific crop production and management

Theory

Unit I

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops: Cereals- rice, maize, sorghum, pearl millet, finger millet and other minor millets.

Unit II

Pulses- pigeonpea, mungbean and urdbean.

Unit III

Oilseeds- groundnut, soybean, sesame, castor.

Unit IV

fibre crops- cotton and jute.

Unit V

Forage crops- sorghum, cowpea, cluster bean, maize, guinea and napier.

Practical (CC302P)

1. Rice nursery preparation
2. Transplanting of rice
3. Sowing of soybean, pigeon pea and mungbean, maize, groundnut and cotton
4. Effect of seed size on germination and seedling vigour of *Kharif* crops
5. Effect of sowing depth on germination of *Kharif* crops
6. Identification of weeds in *Kharif* crops
7. Top dressing and foliar feeding of nutrients
8. Study of yield contributing characters and yield calculation of *Kharif* crops
9. Study of crop varieties and important agronomic experiments at experiential farm
10. Recording biometric observations
11. Study of forage experiments
12. Morphological description of *Kharif* crops
13. Silage and hay making
14. Visit to research centres of related crops.

***Practical Crop Production- One (1) credit from practical of the course is allotted for Practical Crop Production of selected *kharif* crops covered under this course.**

Suggested Readings:

1. B. Gurarajan, R. Balasubramanian and V. Swaminathan. Recent Strategies on Crop Production. Kalyani Publishers, New Delhi.
2. Chidda Singh.1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Rajendra Prasad. Textbook of Field Crops Production - Commercial Crops. Volume II ICAR Publication.
4. S.R. Reddy. 2009. Agronomy of Field Crops. Kalyani Publishers, New Delhi.
5. S.S. Singh. 2005. Crop Management. Kalyani Publishers, New Delhi.
6. UAS, Bangalore. 2011. Package of Practice. UAS, Bangalore.
7. Subhash Chandra Bose, M. and Balakrishnan, V. 2001. Forage Production. South Asian Publishers, New Delhi.

6.

Course Code: CC303T

Course Title: Production Technology of Fruit and Plantation Crops

Credit Hours 2 (1+1)

Objectives:

1. To educate about the different forms of classification of fruit crop
2. To educate about the origin, area, climate, soil, improved varieties and cultivation practices of fruit and plantation crops
3. To educate about the physiological disorders of fruit crops, palms and plantation crops

Theory

Unit I

Production status of fruit and plantation crops: Importance and scope of fruit and plantation crop industry in India; nutritional value of fruit crops; classification of fruit crops; area, production, productivity and export potential of fruit and plantation crops.

Unit II

Crop production techniques in tropical, sub-tropical and temperate fruit crops: Climate and soil requirements, varieties, propagation and use of rootstocks, planting density and systems of planting. High density and ultra-high-density planting, cropping systems, after care – training and pruning; water, nutrient and weed management, fertigation, special horticultural techniques, plant growth regulation, important disorders, maturity indices and harvest, value addition. Fruit crops: mango, banana, papaya, guava, sapota.

Unit III

Citrus, grape, litchi, pineapple, pomegranate, minor fruits- date, ber.

Unit IV

Peach, strawberry, nut crops Jackfruit and, apple, pear

Unit V

Crop production techniques in palms and plantation crops: Climate and soil requirements, varieties, propagation, nursery management, planting and planting systems, cropping systems, after care, training and pruning for plantation crops, water, nutrient and weed management, intercropping, multi-tier cropping system, mulching, special horticultural practices, maturity indices, harvest and yield, pests and diseases, processing- value addition Palms: Coconut, Arecanut, Oil palm and Palmyrah, Plantation crops: Tea, Coffee, Cocoa, Cashewnut, Rubber.

Practical (CC303P)

1. Propagation techniques, selection of planting material, varieties, important cultural practices for mango, banana, papaya, guava, sapota, grapes, Citrus (mandarin and acid lime), pomegranate, jackfruit.
2. Preparation and application of PGR's for propagation.

3. Micro propagation.
4. Protocol for mass multiplication and hardening of fruit crops.
5. Identification and description of varieties, mother palm and seed nut selection.
6. Nursery practices, seedling selection, fertilizers application, nutritional disorders, pests and diseases of Coconut, Arecanut and cocoa, Tea and coffee, Rubber and cashew.
7. Visit to commercial orchard and plantation industries.

Suggested Readings:

1. Banday, F.A. and Sharma, M.K. 2010 Advances in temperate fruit production. Kalyani Publishers, Ludhiana
2. Bose, T.K., S.K. Mitra and D. Sanyal 2001. Fruits: Tropical and Subtropical (2 volumes) Naya Udyog, Calcutta.
3. Bose, T.K., S.K. Mitra, A.A. Farooqi and M.K. Sadhu (Eds). 1999. Tropical Horticulture Vol.1. Naya Prokash, Calcutta.
4. Chadha, K.L. 2001. Handbook of Horticulture. ICAR, Delhi
5. Chadha, T.R. 2001 Textbook of temperate fruits. ICAR, New Delhi.
6. Chattopadhyay, T.K. 2001. A Text Book on Pomology (4 volumes). Kalyani Publishers, Ludhiana.
7. Chattopadhyay. 1998. A textbook on pomology (sub-tropical fruits) vol.III. Published by M/s. Kalyani publishers, Ludhiana, New Delhi, Noida. UP.
8. Chudawat, B. S. 1990. Arid fruit culture Oxford & IBH, New Delhi.
9. Das, B.C. and Das S.N. Cultivation of minor fruits. Kalyani Publishers, Ludhiana
10. David Jackson and N.E. Laone, 1999. Subtropical and temperate fruit production. CABI publications.
11. H.P. Singh and M.M. Mustafa 2009. Banana-new innovations Westville publishing House, New Delhi
12. Kumar, N. 1997. Introduction to Horticulture. Rajalakshmi Publications, Nagercoil, Tamil Nadu.
13. Mitra, S.K., T.K. Bose and D.S. Rathore. 1991. Temperate fruits. Horticulture and allied Publishers, Calcutta.
14. Pal, J.S. 1997. Fruit Growing. Kalyani Publishers, New Delhi.
15. Radha, T. and Mathew, L. 2007. Fruit crops. New India publishing Agency
16. Rajput, CBS and Srihari babu, R. 1985. Citriculture, Kalyani Publishers, Ludhiana

17. Sadhu, M.K. and P.K. Chattopadhyay. 2001. Introductory Fruit Crops. Naya Prokash, Calcutta.
18. Singh, S.P. 2004. Commercial Fruits. Kalyani Publishers, Ludhiana
19. Symmonds. 1996. Banana, II Edn. Longman, London
20. Veeraragavathatham, D., Jawaharlal, M., Jeeva, S., Rabindran, R and Umapathy, G. 2004 (2nd edition). Scientific fruit culture. Published by M/s. Suri associates, 1362/4, Velraj Vihar Complex, Thadagam Road, Coimbatore- 2
21. W.S. Dhillon. 2013. Fruit production in India. Narendra publishing House, New Delhi
22. Kavino, M, V. Jegadeeswari, R. M. Vijayakumar and S. Balkrishnan. 2018. Production Technology of Fruits and Plantation Crops by Narendra Publishing House.
23. Kumar, N.J. B.M. Md. Abdul Khaddar, Ranga Swamy, P. and Irulappan, I. 1997. Introduction to spices, Plantation crops and Aromatic plants. Oxford & IBH, New Delhi.
24. Nair. 1979. Cashew, CPCRI, Kerela
25. Sharma, A., Kumar, P., Tripathi, V.K. 2024. Production Technology of Fruits and Plantation Crops. Elite Publishing House
26. Thampan, P.K. 1981. Handbook of coconut palm. Oxford & IBH, New Delhi.
27. Thompson, P.K. 1980. Coconut. Oxford & IBH, New Delhi
28. V. Ponnuswami, M. Kumar; S. Ramesh Kumar and C. Krishnamoorthy 2015. Fruit and Plantation Crops Narendra Publishing House.

7.

Course Code: CC304T

Course Title: Fundamentals of Extension Education

Credit Hours 2 (1+1)

Objectives

1. State the importance of extension education in agriculture
2. Familiarize with the different types of agriculture and rural development programs launched by govt. of India
3. Classify the types of extension teaching methods
4. Elaborate the importance and different models of communication
5. Explain the process and stages of adoption along with adopters' categories

Theory

Unit I

Education: Meaning, definition and Types; Extension Education: meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning: Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.);

Unit II

Reorganised Extension System (T&V system) various extension/ agriculture development programs launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). Social Justice and poverty alleviation programme: ITDA, IRDP/SGSY/NRLM. Women Development Programme: RMK, MSY etc.

Unit III

New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc., Attributes of Innovation, DWCRA, Commodity Interest Groups (CIGs), Farmers Producer Group (FPG).

Unit IV

Rural Development: concept, meaning, definition; various rural development programs launched by Govt. of India. Community Development: meaning, definition, concept and principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; Method of identification of Rural Leader.

Unit V

Extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programs; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture

journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical (CC304P)

1. To get acquainted with university extension system.
2. Group discussion- exercise.
3. Identification of rural leaders in village situation.
4. Preparation and use of AV aids.
5. Preparation of extension literature (leaflet, booklet, folder, pamphlet news stories and success stories).
6. Presentation skills exercise.
7. Micro teaching exercise.
8. A visit to village to understand the problems being encountered by the villagers/ farmers.
9. To study organization and functioning of DRDA/PRI and other development departments at district level.
10. Visit to NGO/FO/FPO and learning from their experience in rural development.
11. Understanding PRA techniques and their application in village development planning.
12. Exposure to mass media.
13. Visit to community radio and television studio for understanding the process of programme production.
14. Script writing, writing for print and electronic media, developing script for radio and television.

Suggested readings:

1. Adivi Reddy, A. 2001. Extension Education, Sree Lakshmi press, Bapatla.
2. Dahama, O. P. and Bhatnagar, O.P. 1998. Education and Communication for Development, Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
3. Jalihal, K. A. and Veerabhadraiah, V. 2007. Fundamentals of Extension Education and Management in Extension, Concept publishing company, New Delhi.
4. MuthaiahManoraharan, P. and Arunachalam, R., Agricultural Extension, Himalaya Publishing House (Mumbai).
5. Sagar Mondal and Ray, G. L., Text Book on Rural Development, Entrepreneurship and Communication Skills, Kalyani Publications.
6. Rathore, O. S. et al. 2012. Handbook of Extension Education, Agrotech Publishing Academy, Udaipur.
7. Dudhani, C.M., Hirevenkatgoudar, L.V., Manjunath, L. Hanchinal, S.N. and Patil, S.L. 2004. Extension Teaching Methods and Communication Technology, UAS, Dharwad.
8. Sandhu, A.S. 1993. Text book on Agricultural Communication: Process and Methods. Oxford and IBH Publishing Pvt. Ltd, New Delhi.
9. Singh, A.K., Lakhan Singh, R. and Roy Burman. 2006. Dimensions of Agricultural Extension. Aman Publishing House, Meerut.

8.

Course Code: CC305T

Course Title: Fundamentals of Nematology

Credit Hours 2 (1+1)

Objectives

1. To impart knowledge on history, economic importance of plant parasitic nematodes, morphology, biology, host parasitic relationship of nematodes.
2. To impart knowledge on nematode pests of different crops of national and local importance and their management.

Theory

Unit I

Introduction: History of phytonematology, habitat and diversity, economic importance of nematodes. General characteristics of plant parasitic nematodes.

Unit II

Nematode: definition, general morphology and biology. Classification of nematodes up to family level with emphasis on groups containing economically important genera. Classification of nematodes on the basis of feeding/ parasitic habit.

Unit III

Symptomatology, role of nematodes in disease development, Interaction between plant parasitic nematodes and disease-causing fungi, bacteria and viruses.

Unit IV

Nematode pests of crops: Rice, wheat, vegetables, pulses, oilseed and fiber crops, citrus and banana, tea, coffee and coconut.

Unit V

Different methods of nematode management: Cultural methods, physical; methods, Biological methods, Chemical methods, Plant Quarantine, Plant resistance and INM.

Practical (CC305P)

1. Sampling methods, collection of soil and plant samples.
2. Extraction of nematodes from soil and plant tissues following Cobb's sieving and decanting technique, Baermann funnel technique.
3. Picking and counting of plant parasitic nematode.
4. Identification of economically important plant nematodes up to generic level with the help of keys and description.
5. Meloidogyne, Pratylenchus; Heterodera, Tylenchulus, Xiphinema, and Helicotylenchus etc.
6. Study of symptoms caused by important nematode pests of cereals, vegetables, pulses, plantation crops etc.
7. Methods of application of nematicides and organic amendments.

Suggested readings:

1. Economic Nematology-Edited by J.M. Webster
2. Plant Parasitic Nematodes (Vol-1) by Zukerman, Mai, Rohde
3. Plant Parasitic Nematodes of India: Problems and Progress by - Gopal Swarup, D. R. Dasgupta, P. K. Koshy.
4. Text book on Introductory Plant Nematology -R.K. Walia and H.K. Bajaj.

9.

Course Code: CC306T

Course Title: Principles and Practices of Natural Farming

Credit Hours 2 (1+1)

Objectives

1. To provide comprehensive understanding and knowledge to students about natural farming.
2. To teach students the concept, need and principles of native ecology-based production under natural farming.
3. To impart practical knowledge of natural farming and related agricultural practices in Indian and global environmental and economic perspectives.

Theory

Unit I

Indian Heritage of Ancient Agriculture, History of Natural Farming, Importance of natural farming in view of climate change, soil health, water use carbon sequestration, biodiversity conservation, food security and nutritional security, and sustainable development goals (SDGs),

Unit II

Concept of natural farming; Definition of natural farming; Objective of natural farming, Essential characteristics and Principles of natural farming; Scope and importance of natural farming. Main Pillars of natural farming; Methods/ types/schools of natural farming.

Unit III

Characteristics and design of a natural farm, Concept of ecological balance, ecological engineering and community responsibility in natural versus other farming systems, Introduction to concept of ecological, water, carbon and nitrogen foot prints, Concept and evaluation of ecosystem services, integration of crops, trees and animals, cropping system approaches,

Unit IV

Biodiversity, indigenous seed production, farm waste recycling, water conservation and renewable energy use approaches on a natural farm, Rearing practices for animals under natural farming, Nutrient management in natural farming and their sources, Insect, pest, disease and weed management under natural farming; Mechanization in natural farming, Processing, labelling, economic considerations and viability, certification and standards in natural farming, marketing and export potential of natural farming produce and products.

Unit V

Initiatives taken by Government (central/state), NGOs and other organizations for promotion of natural farming and chemical free agriculture, Case studies and success stories in natural farming and chemical free traditional farming, Entrepreneurship opportunities in natural farming.

Practical (CC306P)

1. Visit of natural farm and chemical free traditional farms to study the various components and operations of natural farming principles at the farm.

2. Indigenous technical knowledge (ITK) for seed, tillage, water, nutrient, insect-pest, disease and weed management.
3. On-farm inputs preparation methods and protocols.
4. Studies in green manuring in-situ and green leaf manuring.
5. Studies on different types of botanicals and animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management.
6. Weed management practices in natural farming.
7. Techniques of Indigenous seed production- storage and marketing.
8. Partial and complete nutrient and financial budgeting in natural farming.
9. Evaluation of ecosystem services in natural farming (Crop, Field and System).

Suggested readings:

1. Ayachit, S.M. 2002. Kashyapi Krishi Sukti (A Treatise on Agriculture by Kashyapa). Brig Sayeed Road, Secunderabad, Telangana: Asian Agri-History Foundation 4: 205.
2. Boeringa, R. (Eed.). 1980. Alternative Methods of Agriculture. Elsevier, Amsterdam, 199 pp.
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