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एन सी ई आर टी
NCERT

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Competency Based Curriculum

For Classes 9 to 12 (NSQF Levels 1 to 4)

Course: Agriculture
(Job Role: Paddy Farmer)

Developed by

Prof. (Dr.) Asfa M. Yasin

Professor, Department of Agriculture and Animal Husbandry



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March, 2015

Publication No: 234-1-43-3H

No of copies: 300

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Published by the Joint Director, PSS Central Institute of Vocational Education (PSSCIVE), NCERT, Shyamla Hills, Bhopal - 462 013, Madhya Pradesh and printed at M/s Gupta Graphics, Bhopal

PREFACE

Ministry of Human Resource Development, Government of India developed the National Skill Qualification Framework (NSQF) to introduce vocational courses from class 9th onwards. The NSQF organizes qualifications according to a series of levels of knowledge and skills. These levels are defined in terms of learning outcomes i.e., the competencies (knowledge, skills and attitude) which the learners must possess regardless of whether they were acquired through formal, non-formal or informal education and training system. Qualifications are made up of occupational standards for specific areas of learning units or unit of competency. Units of competency are the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance expected in the workplace. The unit of competency or National Occupation Standards comprising generic and technical competencies an employee should possess are laid down by the Sector Skill Council of the respective economic or social sector.

Competency is defined in terms of what a person is required to do (performance), under what conditions it is done (conditions) and how well it is to be done (standards). It can be broadly categorized into foundational, practical and reflexive competencies. Generic competencies are considered essential for a person to participate effectively in the workforce, whereas technical competencies are an individual's knowledge and expertise in the specific group task and its processes and its rules and regulations. An executive order F.No.1-4/2011-VE dated 3 Sept., 2012 on the various aspects of NVEQF has been issued by the MHRD. For more details on the NVEQF, please visit the website of MHRD at www.mhrd.gov.in

The competency based curriculum is broken down into coherent parts known as Units. Each unit is further broken down into knowledge and skills on the basis of which evidence is to be provided by the learner and the evaluation is to be done by the teacher or trainer.

PSSCIVE which is part of NCERT New Delhi is mandated by Government of India as an apex R&D Institute for Vocational Education. The institute has taken up development of curriculum and courseware for classes 9th to 12th to introduce vocational courses in secondary and senior secondary schools in of the country.

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1. About the Course

Agriculture is the cultivation of plants, fungi, and other life forms for food, fiber, medicinal and other products used to sustain and enhance human life. It also includes livestock production which provides milk and meat products, fibers and other raw materials. The major agricultural products can be broadly grouped into foods, fibers, fuels, meat, spices and raw materials. Fibers include cotton, wool, hemp, silk and flax. Agriculture and allied sectors, like forestry and fisheries in India accounted for 13.7% of the GDP (Gross Domestic Product) in 2013. India is the world's largest producer of many fresh fruits and vegetables, milk, major spices fresh meat, fibrous crops, such as jute. India is the second largest producer of wheat and rice, the world's major food staples.

Over one third of the world's workers are employed in agriculture, second only to the service sector. In India agriculture employs about 50% of the total workforce.

The Ministry of Agriculture is the main authority in India for regulation and development of activities relating to agriculture, horticulture, fishing, animal husbandry, etc. It is implementing various schemes and policies for the sector through its various departments and institutions, including Department of Agriculture and Cooperation and Department of Animal Husbandry, Dairying and Fisheries. The Ministry of Food Processing Industries is actively engaged in promotion of entrepreneurial activities in the segments of fruits and vegetables processing, fish processing, mushroom processing, honey processing, etc. Besides, commodity boards, like tea board, coffee board, rubber board, medicinal plants board, etc. have been set up to boost the growth of the sectors like tea, coffee, rubber, medicinal plants, respectively.

There exists innumerable business opportunities in the agriculture and allied sectors. Education and training in agriculture meet the requirements of industries that employ educated personnel and also prepare people for undertaking farming and allied activities. Higher education in agriculture is required for meeting the needs of human resource needed for conducting research, teaching and training. Introduction of vocational courses in agriculture is seen as a strategy to create educated and productive workforce who will employ scientific methods for promoting sustainable agriculture.

It is with this view the Govt. of India has brought this neglected sector under the umbrella of National Skill Development Mission. The constitution of Agriculture Skill Council of India (ASCI) under the National Skill Development Corporation (NSDC) is a step forward for skill development initiative through formal and non-formal system of education and training under NSQF and STAR/ Ajeevika schemes respectively. Consequently, job roles have been identified and National Occupational Standards have been developed by ASCI in prominent agriculture areas where there is demand for skilled human resource and/ or job opportunities for self and wage employment.

It is encouraging to note that many states are coming forward to offer agriculture based vocational courses in secondary and senior secondary classes under NSQF as per job roles identified by ASCI. There is a need to develop curricula for these job roles. In school system under NSQF this curriculum has been developed for L1 to L4 to develop competencies and skills required for performing job role of Paddy Farmer.

2. Objectives of the Course

Upon completion of this course, you will be able to:

1. Describe the importance of agriculture in our lives and Indian economy.
2. Demonstrate the knowledge of processes and preparations involved in the basic agricultural practices for production of different crops in different seasons.
3. Demonstrate the knowledge of basic animal husbandry practices for production of milk, fishes and shrimp, poultry birds, honey, etc.
4. Demonstrate the knowledge of field operations in production and marketing of paddy.
5. Communicate effectively at workplace.
6. Demonstrate the knowledge of safe handling of equipment and chemicals.
7. Demonstrate the knowledge of occupational health and safety measures.
8. To understand the improved and new paddy cultivation techniques of paddy.
9. To identify various weeds, diseases and insects of paddy fields and to understand the control measures of weeds/ pest and diseases.
10. To understand the water management of paddy fields and intercultural operations in paddy.
11. To understand about the harvesting, rice straw management, storage and marketing of paddy.

3. Course Structure

NSQF Level-1 (Class 9)

Sl. No.	Unit Code	Unit Title	No. of Notional Learning Hours
1.	AG101-NQ2014	Introduction to Agriculture	20
2.	AG102-NQ2014	Introduction to Soil Management	20
3.	AG103-NQ2014	Introduction to Field Preparation and Planting	20
4.	AG104-NQ2014	Communication at Workplace	20
5.	AG105-NQ2014	Introduction to Agricultural Crops	20
6.	AG106-NQ2014	Introduction to Animal Husbandry	20
7.	AG107-NQ2014	Introduction to Occupational Safety and Appropriate Technology	15
8.	AG108-NQ2014	Marketing of Agriculture Produce	15
Total			150

Successful completion of **150 hours** of theory sessions and **50 hrs** of practical activities and on-the-job learning is to be done for full qualification.

NSQF Level-2 (Class 10)

Sl. No.	Unit Code	Unit Title	No. of Notional Learning Hours
1	AG201-NQ2014	Applied Agricultural Practices	25
2	AG202-NQ2014	Introduction to Quality of Seeds and Seed Treatment	25
3	AG203-NQ2014	Introduction to Integrated Pest Management	25
4	AG204-NQ2014	Introduction to Micro-irrigation Practices	25
5	AG205-NQ2014	Introduction to Animal Husbandry Practices - Handling, Housing and Feeding	25
6	AG206-NQ2014	Introduction to Animal Husbandry Practices - Disease Management	25
Total			150

Successful completion of **150 hours** of theory sessions and **50 hrs** of practical activities and on-the-job learning is to be done for full qualification.

NSQF Level-3 (Class 11)

Sl. No.	Unit Code	Unit Title	No. of Notional Learning Hours
1	AG301-NQ2014	Introduction to Paddy Cultivation	20
2	AG302-NQ2014	Rice Varieties in India	15
3	AG303-NQ2014	Nursery Preparation	25
4	AG304-NQ2014	Seedling Management and Transplantation/ Crop Establishment	25
5	AG305-NQ2014	Water Management	10
6	AG306-NQ2014	Integrated Nutrient Management	20
7	AG307-NQ2014	Integrated Pest Management and Disease Management	25
8	AG308-NQ2014	Weed Management	10
Total			150

Successful completion of **150 hours** of theory sessions and **50 hrs** of practical activities and on-the-job learning is to be done for full qualification.

NSQF Level-4 (Class 12)

Sl. No.	Unit Code	Unit Title	No. of Notional Learning Hours
1	AG401-NQ2014	Straw Management	10
2	AG402-NQ2014	Intercultural Operations in Paddy	20
3	AG403-NQ2014	Harvesting and Storage	20
4	AG404-NQ2014	Health and Safety at Workplace	20
5	AG405-NQ2014	Handling Emergency Situations	20
6	AG406-NQ2014	Rights and Responsibilities of Paddy Workers	20
7	AG407-NQ2014	Paddy Marketing	20
8	AG408-NQ2014	Communication skills at workplace	20
Total			150

Successful completion of 150 hours of theory sessions and 50 hrs of practical activities and on-the-job learning is to be done for full qualification.

4. Classroom Activities

Classroom activities are an integral part of this programme and interactive lecture sessions, followed by discussions should be conducted by teachers. A variety of instructional strategies should be used by teachers to ensure learning of students. Teachers should make lesson plan topic wise along with different strategies to be used in the class room /laboratory/workshop. The class room activities may include use of multi-media packages, preparation of charts and posters and organising group discussion sessions targeted to problem solving, innovative ideas in handling the job role, developing communication and entrepreneurial skills etc. To understand importance of Agriculture as profession, the class based activities may include:

- i. Preparation of charts, collages, posters depicting economic importance of different crops viz. food grain, oil seed, cash crops, pulses, etc.
- ii. Charts for different seasons and parts of India with respect to crops prominently grown there
- iii. Group discussions on agriculture related topics and to focus on GDP, export of agriculture produce and understanding of patents and value added agri-products
- iv. Video films on agriculture practices undertaken in India and abroad with special focus on Storage of breeder seed and food grains in ware houses with understanding of pests and disease control

5. Practical Activities

Activities that provide practical experience in clinical set up would include hands on training on mannequins, simulated clinical set up, case based problems, role play, games, etc. on various clinical incidents and practical exercises in skill lab. Equipment and supplies should be provided to enhance hands-on experiences for students. Trained personnel should teach specialized techniques. A training plan signed by teacher that reflects equipment, skills and tasks should be prepared for training of the students in the organization/industry. The course may involve following practical activities:

1. Acquaintance with seeding equipments.
2. Acquaintance with application of NPK and organic and green manure in nursery bed and in paddy field.

3. Collection and identification of different types of soils, pests / disease and their damaged materials and different varieties of paddy.
4. Demonstration by video, charts, posters of farm activities such as nursery bed preparation, field preparation, seed sowing, manuring, irrigation techniques, harrowing, de-weeding, nutrient management, etc.
5. Different methods of sowing (transplanting manually, hand operated transplanter and SRI planting methods).
6. Demonstration of paddy harvester, cono-combiner, thresher and safe methods of handling the pesticides/ agrochemicals.
7. Demonstration of Safely use of different harvesting and threshing reapers and implements.
8. Familiarisation with farm inputs viz. seeds, fertilizers, manures, pesticides, farm implements, equipment, tools, etc.
9. Preparation of Herbarium of paddy weeds, paddy parts, organic and inorganic fertilizers, pests and diseased plants.
10. Identification of critical stage of paddy for water management scheduling.
11. Identification of beneficial predator /parasites, major pests and disease of rice and their symptoms.
12. Integrated nutrient management, Pest Management and Disease Management in rice.
13. Different methods for seed storage and seed moisture maintenance in storage.
14. Pest surveillance through light traps, pheromone traps and field incidence and methods to control pest and diseases.
15. *Practice on Biasi* operations, ploughing in standing fields and water conservation methods under emergency situation.
16. Study of intercultural operation equipments in paddy.
17. Study of seed characters and suitable varieties of rice for different eco system.
18. Survey for understanding marketing chains of agri-produce, demand and supply system.
19. Preparation of different product through paddy straw and its uses.
20. Visit of state warehouse godowns, Krishi Upaj Mandi and commodity market.

6. On-the-Job Training

On-the-job training (OJT) occurs whenever more experienced employee or supervisor teaches less experienced person on how to do one or more tasks of a job. The training utilizes actual equipment and materials. OJT should be undertaken in a structured manner with a training plan under the supervision of an experienced trainer or supervisor. A training plan that reflects tasks to be performed and competencies to be imparted should be prepared and signed by the student, teacher, and supervisor at the workplace for training of the students in the organization/industry. The job role i.e. understanding basics of agriculture, crop production practices and management related tasks to be undertaken at the work place during OJT may include:

1. Nursery/seed bed preparation and the layout of field.
2. Collection methods and analysis of soil samples for pH, EC and NPK.
3. Sowing methods and germination test.
4. Preparation of vermi-compost, green manure.
5. Handling implements used in seed sowing, inter-culture operations, irrigation, weed control and pest management, manuring and application of fertilizers.

6. Imparting preliminary knowledge of handling and maintenance of pesticide application equipments, the interested students may develop efficiency in repair and maintenance of pesticides application equipments.
7. Maintenance of breeding for A, B and R lines in hybrid rice.
8. Acquaintance with paddy varieties resistant to biotic and abiotic stress.
9. Training on cultural, mechanical, biological and chemical management of pests and diseases in paddy field.
10. Acquaintance with various nutrient management problems of the standing paddy field.
11. The student will also conduct a survey on adoption of recommended nutrient management measures.
12. Training on preparation of biofertilizer (Azolla etc) and organic Manuring.
13. Acquaintance with various plant protection problems of the paddy farming.
14. Information on nematode problems, bird and rodent damage if any, shall also be mentioned in paddy field in the plant protection recorded separately.
15. The students will also demonstrate preparation of pesticide solution for spraying to control pest in paddy.
16. Identification of different weed in paddy field.
17. Recording observations on various weed management problems of the standing paddy field on weekly/monthly basis.
18. Students shall maintain record of weed management work undertaken in the prescribed performa given to them by the Department of Agronomy for this purpose.
19. The student will also conduct a survey on adoption of recommended weed management measures and the incidence/occurrence of different weeds on different paddy fields.
20. The students will also demonstrate preparation of herbicides spray fluids for important plant protection measures.
21. Training on Rice straw management.
22. Training on Post harvest technology of rice.
23. Training for safe storage of paddy bags.
24. Training for quality seed maintenance.
25. Training on operation of seed processing plants.
26. Training and management skill for marketing paddy produce.

The trainer should break down all the steps of the job and train the students as per the training plan. In a structured OJT, the following steps should be followed:

Step 1: The Instructor or the trainer tell, show, demonstrate, and explain. The trainer gives an overview of the task while explaining the constructional details and use of the tools, equipment, materials, etc. in performing the tasks.

Step 2: The Instructor or the trainer demonstrates each step in detail, actually doing the steps of the task and explaining each step, one at a time, while the trainee watches. The steps may not necessarily be demonstrated in the sequence of actual operation, as sometimes it is better that simple tasks are demonstrated first to build confidence. Showing finished products at each appropriate step will help the learner understand what is required as outcome. While demonstrating, the trainer explains why each step is done in the way it is done.

Step 3: It involves direct trainee participation. The trainer monitors the progress on a checklist of competencies and offers feedback and pointers where and when needed.

Step 4: The trainee practices with clearly defined targets for performance standards.

7. Certification

Upon successful completion of this course the State Education Board and the Agriculture Sector Skill Council (ASCI) will provide a certificate to the student verifying the competencies acquired by the candidate. For more details about ASCI visit the website at <http://www.asci-india.com>.

8. Units

NSQF Level-1 (Class 9)

Unit Code: AG101-NQ2014			
Unit 1 Title: Introduction to Agriculture (Duration: 20 hours)			
Location : Classroom and Agricultural Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe the importance of agriculture in Indian economy	<ol style="list-style-type: none"> Describe the importance of agriculture(e.g. subsistence farming, organic farming, large scale farming and commercial farming) as a source of livelihood and increasing agricultural production Describe the share of agriculture in national income Describe the contribution of agriculture in employment Explain how agricultural products serve as a source for Industrial development (products may include but not limited to cotton, wool, sugar, jute, rice, wheat, etc.) 	<ol style="list-style-type: none"> List the various agricultural products that promote Industry and contributes to the growth of Indian economy Identify the factors Influencing agriculture (factors may include but not limited to weather, agriculture inputs, diseases, pests, etc.) 	<p>Interactive lecture: Role of Agriculture in Indian Economy</p> <p>Activity:</p> <ul style="list-style-type: none"> Discussion sessions on the agricultural revolutions (green, yellow, white, blue, gray, golden, etc.) and how these revolutions affected the livelihood and employment opportunities. Discussion sessions on contributions of Agriculture in Indian economy. Ask students to prepare posters of various agricultural products which are used for industrial productions and their contribution to the industrial growth.
Map the States according to their contributions in production of major crops of India (Wheat, Rice, Soyabean, Gram, Sugarcane and Cotton)	<ol style="list-style-type: none"> Describe the chief characteristics of major crops Enlist States with major contribution to the cultivation of the following crops: <ul style="list-style-type: none"> Wheat: Punjab, Haryana, Uttar Pradesh Rice: West Bengal, Chhattisgarh, Tamil Nadu Soybean: Madhya Pradesh, Maharashtra, Rajasthan Gram: Madhya Pradesh, Rajasthan, Uttar Pradesh Sugarcane: Uttar Pradesh, Maharashtra, Tamil Nadu Cotton: Gujarat, Andhra Pradesh, Maharashtra 	<ol style="list-style-type: none"> Identify the different crops by seed/plant samples Map the crops with the States making major contribution in their cultivation. 	<p>Interactive lecture: Major Food, Oilseed and Cash crops and contribution of States in Large Scale Production</p> <p>Activity:</p> <ul style="list-style-type: none"> Field visits for identification of major food grain crops, oilseed crops and cash crops Spot identification Discuss the agriculture map of the States. (available on http://www.mapsofindia.com)

Unit Code: AG102-NQ2014			
Unit 2 Title: Introduction to Soil Management (Duration: 20 hours)			
Location : Classroom, Soil Testing Laboratory and Agricultural Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of the components of soil and factors affecting soil fertility	<ol style="list-style-type: none"> Describe the importance of soil and nutrients as primary, secondary and micro - e.g. soil as a medium of plant growth Describe the factors affecting soil formation and fertility Describe the composition of soil Describe the physical properties of soil (texture, structure, density, porosity, colour, consistency, etc.) Describe the chemical properties of soil (pH, salinity, cation exchange capacity, C:N ratio) Differentiate between different types of soil (soils may include but not limited to alluvium, black, red, laterite, desert, mountain, saline, alkaline, peaty, marshy, etc.) Describe the method for collection of soil sample for soil testing 	<ol style="list-style-type: none"> Identify different type of alluvium soils viz., loam, clay loam, and sandy Enlist various nutrients Demonstrate the knowledge of soil properties and their role in growth of plants Demonstrate the knowledge of soil textural classes - sand, silt, clay & loam 	<p>Interactive lecture: Properties of Soil and factors affecting Soil Fertility</p> <p>Activity:</p> <ul style="list-style-type: none"> Study of equipment used for soil sampling and testing Collection of soil samples for soil testing Determination of soil texture by feel method Demonstration of determination of soil pH Discussion on soil test report and fertilizer recommendations Identification of different types of soils
Identify the fertilizers used in agriculture crop production	<ol style="list-style-type: none"> Describe the chief characteristics of the following fertilizers <ul style="list-style-type: none"> Nitrogen fertilizers Phosphatic fertilizers Potassic fertilizers Complete fertilizers Slow release or time release fertilizers Mixed complex Bio-fertilizers Manure Describe advantages and limitations of chemical fertilizers Describe advantages and limitations of bio-fertilizers Describe the general deficiency symptoms of N, K, P, Mn, Zn, etc. 	<ol style="list-style-type: none"> Identify the different types of chemical and biological fertilizers, including but not limited to the following: <ul style="list-style-type: none"> Nitrogen fertilizers Phosphatic fertilizers Potassic fertilizers Mixed complex Rhizobium fertilizers Arbuscular mycorrhiza Azolla Anabaena Blue-green algae List the mobile and volatile forms of nitrogen ions. 	<p>Interactive lecture: Chemical and Bio-fertilizers</p> <p>Activity:</p> <ul style="list-style-type: none"> Identification of various types of chemical and biological fertilizers in laboratory and field Read the label on the packets of fertilizers and discuss the various aspects, such as ratio of N:P:K, purity and utility for the different crops, etc.
Demonstrate the knowledge of different	<ol style="list-style-type: none"> Describe the different methods of fertilizer application (broadcasting, 	<ol style="list-style-type: none"> Identify the different methods of fertilizer application through 	<p>Interactive lecture: Methods of Fertilizer Application</p>

methods of fertilizer application	<p>basal application, row/band placement, foliar application, side dressing, fertigation)</p> <p>2. Describe advantages and limitations of various methods of fertilizer application</p>	<p>diagram, charts, and field demonstration.</p>	<p>Activity:</p> <ul style="list-style-type: none"> Field visit to study the nutritional disorders and symptoms in various crops due to N,P,Zn deficiency Demonstration of various methods of application of chemical and bio-fertilizers in nursery and field
Demonstrate the knowledge of various methods of irrigation	<p>1. Describe the different sources of irrigation (well, tube-well, canal, tank, etc.)</p> <p>2. Describe different methods of irrigation (surface, sub-surface, flood, sprinklers, micro-sprinklers, drip or trickle)</p> <p>3. Describe the factors that affect the choice of irrigation method (quantity or volume, frequency, cost, etc.)</p> <p>4. Classify soil water - hygroscopic, capillary and gravitational water</p> <p>5. Describe the use of watering cans, pitcher cans, perforated plastic sleeves and other indigenous methods of irrigation</p>	<p>1. Identification of methods of irrigation through charts, diagrams, models, and field demonstration</p> <p>2. Demonstrate the knowledge of choosing the appropriate irrigation method for a crop</p>	<p>Interactive lecture: Methods of Irrigation</p> <p>Activity:</p> <ul style="list-style-type: none"> Discussion on charts, models and diagrams of methods of irrigation and selection of irrigation method for different crops Field visit to study the various methods of irrigation, especially the micro-irrigation techniques and techniques for conserving water

<p>Unit Code : AG103-NQ2014</p> <p>Unit 3 Title : Introduction to Field Preparation and Planting (Duration: 20hours)</p> <p>Location : Classroom, Agro-meteorology Laboratory, Agriculture Field</p>			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of the role and importance of weather instruments and forecasting in agriculture	<p>1. Describe the various weather parameters that affect the growth and development of agricultural crops - temperature, moisture, rainfall, wind, etc.</p> <p>2. Describe the use of various instruments and equipment used for weather forecasting - thermometer, soil thermometer, wind vane, anemometer, rain gauge, sling psychrometer, barometer, etc.</p>	<p>1. Demonstrate the knowledge of applications of various weather forecasting instruments and equipment</p>	<p>Interactive lecture: Agro-meteorology</p> <p>Activity:</p> <ul style="list-style-type: none"> Visit to a agro-meteorology observatory to study weather instruments and forecasting methods. Measurement of maximum and minimum air temperature Measurement of soil temperature Measurement of wind speed and direction Measurement of rainfall
Demonstrate the knowledge of field and	<p>1. Describe the factors that need to be considered while selecting method for</p>	<p>1. Identify the implements/equipment used</p>	<p>Interactive lecture: Field Preparation</p>

seedbed preparation	field/seed bed preparation 2. Describe the factors affecting seed germination and emergence 3. Differentiate between conventional method of cultivation, minimum tillage and direct drilling. 4. Describe the procedure adopted for field preparation (ploughing, puddling, leveling, harrowing) 5. Differentiate between shallow and deep ploughing 6. Describe summer ploughing 7. Describe the purpose of puddling, leveling and harrowing	for field preparation 2. Demonstrate the use of some basic implements and equipment used in field preparation 3. Demonstrate basic practices for field preparation.	Activity: <ul style="list-style-type: none"> • Identification of implements/equipment (may include but not limited to spade, indigenous plough, mould board plough, chisel plough, disc harrow, blade harrow, ridge, cultivators, levelers)
Demonstrate the knowledge of sowing/planting methods	1. Describe the types of sowing (hand sowing or open field) 2. Describe the various methods of sowing (broadcasting, drilling, dibbling, etc.) 3. Describe the procedure for pre-treatment of seeds before sowing (e.g. seed soaking, seed scarification)	1. Demonstrate the knowledge of the following: <ol style="list-style-type: none"> a. Hand sowing (flat sowing, ridge sowing and wide bed sowing) b. Open field planting 2. Demonstrate seed soaking 3. Demonstrate sowing of seeds in nursery beds/pots	Interactive lecture: Sowing and Planting Methods Activity: <ul style="list-style-type: none"> • Visit to the field to perform pre-seed treatment and practice various methods of sowing and planting • Sow seeds in pots/nursery beds

Unit Code : AG104-NQ2012

Unit 4 Title : Communication at Workplace (Duration: 20 hours)

Location : Classroom and Field

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
1. Understands meaning, concept and importance of communication skills at workplace 2. Know different types of skills required at workplace 3. Understand and respond written	1. What is communication and its importance at workplace? 2. What are the different types of communication skills including value based communication and entrepreneurial skills i.e. listening to all members of the team, empathy,	1. Explain communication 2. What do you understand about communication and its importance at workplace 3. Write different types of communication skills 4. Enlist four linguistic skills required for communication with example of each one related to the job role 5. Effective communication	1. Organising video and interactive sessions on communication and technological skills required at workplace 2. Showing video shots specially taken for communication at agriculture field during various field operations e.g. nursery bed preparation, transplantation and seed

<p>communication</p> <p>4. Acquired all four linguistic skills i.e. writing, speaking, listening and reading skills in relation to the job role</p> <p>5. Effectively communicate at workplace with supervisors and field staff including unskilled labour force</p> <p>6. Handle job related technological skills in relation to communication</p>	<p>patience, clarity in instructions, positivity, use of respectful language (oral skills) and ability to resolve conflicts amongst team members at workplace</p> <p>3. What technological skills are required at workplace and how to develop these in trainees?</p> <p>4. What methods are used to develop effective communication skills in trainees required at workplace?</p>	<p>at workplace i.e. agriculture field, dairy farm, shrimp hatchery, etc.</p>	<p>sowing, spraying of chemicals, application of fertilizers and manure, harrowing etc. where instructions to field staff are involved.</p> <p>3. Practice sessions on writing, listening, reading and speaking skills for correct pronunciation of different implements, equipment, chemicals, crops, seeds and variety names in Hindi, English or common local specific names</p> <p>4. This practice is required for clear instructions to us and semi-skilled workers at the field during farm operations</p>
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Unit Code : AG105-NQ2014

Unit 5 Title: Introduction to Agricultural Crops (Duration: 20 hours)

Location : Classroom, Plant Breeding Research Centre, Tissue Culture Laboratory Agricultural Farm, Polyhouse

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Name the important food crops, oil seed crops and cash crops grown in Kharif, Rabi and Zaid season	<p>1. Describe the sowing and harvesting season for the following:</p> <ul style="list-style-type: none"> • Kharif (e.g. Sowing - May to July and Harvesting - September to October) • Rabi • Zaid <p>2. Classify major agricultural crops according to the season</p>	1. Enlist the food crops, oil seed crops, and cash crops according to the season in which they are grown	<p>Interactive lecture: Classification of Crops according to Season</p> <p>Activity:</p> <ul style="list-style-type: none"> • Identification of seeds of field crops • Identification of field crops in agriculture farm/field
Describe the different fibre crops used for cultivation in India	1. Describe the chief characteristics of fibre crops grown in India and their uses (cotton, jute, sun-hemp, linseed, patsan)	1. Identification of different fibers and fibre crops viz. cotton, jute, sun-hemp, linseed, etc.	<p>Interactive lecture: Fibre Crops</p> <p>Activity:</p> <ul style="list-style-type: none"> • Draw charts showing fibre crops and their uses • Visit to agricultural farm to study the characteristics of fibre crops
Describe the different fodder crops (season wise)	1. Describe the characteristics of fodder crops- chari (sorghum), berseem (clove), oat, cluster-bean, lobia, lucerne, sudangrass	1. Identify different fodder crops- chari (sorghum), berseem, lobia, lucern, etc.	<p>Interactive lecture: Fodder Crops</p> <p>Activity:</p> <ul style="list-style-type: none"> • Draw charts showing fodder crops and their uses • Spot identification of different fodder crops

Demonstrate the knowledge of methods used for crop improvement	<ol style="list-style-type: none"> 1. Describe the factors which affect crop yields and seed quality 2. Describe the various methods used for crop improvement (methods may include, but not limited to tissue culture, hybrids, transgenic varieties) 	<ol style="list-style-type: none"> 1. Enlist common varieties of major crops which have been developed using hybridization 2. Describe at least 3 varieties of major crops 	<p>Interactive lecture: Crop Improvement</p> <p>Activity:</p> <ul style="list-style-type: none"> • Visit to Plant Breeding Research Centre/Tissue culture laboratory to study the various methods used for crop improvement • Prepare charts of pictures displaying various methods of crop improvement
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Unit Code : AG106-NQ2014			
Unit 6 Title: Introduction to Animal Husbandry (Duration: 20hours)			
Location: Classroom, Dairy Farm/ Sheep Farm/Goat Farm/Piggery Farm/ Poultry Farm/Fish Farm			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe the importance of livestock	<ol style="list-style-type: none"> 1. Describe how livestock contribute to the livelihood of people in India 2. Describe the contribution of livestock to the share of agriculture in national income 3. Describe the various terms used in animal husbandry 4. Explain how livestock products serve as a source of industrial development (e.g. milk, ghee, khoya, butter, etc.) 	<ol style="list-style-type: none"> 1. Enlist animals included in livestock 2. Identify various species of livestock 3. Relate utility of animal husbandry to national economy of India 4. Enumerate uses of livestock 	<p>Interactive lecture: Livestock Production</p> <p>Activity: Discussion on the contributions of livestock in growth and development of Indian economy.</p>
Identify breeds of livestock like Cow, Buffalo, Sheep, Goat, Pig	<ol style="list-style-type: none"> 1. Enlist breeds of livestock 2. Describe the body parts of cattle, sheep, camel, yak, pig, goat, poultry, etc. 	<ol style="list-style-type: none"> 1. Identify body parts of cattle, sheep, goat, hen, camel, yak, pig, etc. 2. Identify breeds of different animals 3. Differentiate breeds of animals according to their utility 	<p>Interactive lecture: Breeds of Livestock</p> <p>Activity:</p> <ul style="list-style-type: none"> • Study of body parts of cattle, sheep, goat, camel, yak, pig, hen, etc. • Visit to a livestock centre to study the breeds of livestock maintained by the centre. Also study the routine farm operations carried out by the centre.
Describe the various types of housing for livestock	<ol style="list-style-type: none"> 1. Enlist type of houses for various animals 2. Describe different type of animal houses 3. Classify different types of poultry houses 4. Describe the 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of loose housing system, cattle shed, shed for calves, etc. 	<p>Interactive lecture: Housing of Animals</p> <p>Activity</p> <ul style="list-style-type: none"> • Visit to Dairy farm and poultry farm to identify various types of houses

	<p>advantages of tail to tail system and face to face system of arrangement for cattles</p> <p>5. Describe the importance of sanitation in cattle farm/poultry farm, etc.</p>		
Describe feed and its classification	<ol style="list-style-type: none"> 1. Classify animal feed 2. Enlist animal feeds- hay, straw, silage, pelleted feeds, oils and mixed rations, sprouted grains, legumes, feed supplements, etc. 	<ol style="list-style-type: none"> 1. Identify different types of animal feeds 	<p>Interactive lecture: Animal Feed</p> <p>Activity</p> <ul style="list-style-type: none"> • Visit to Agricultural Farm to identify various types of fodder crops • Identify different types of animal feeds
Differentiate between healthy and unhealthy animals	<ol style="list-style-type: none"> 1. Enlist symptoms of healthy and unhealthy animals 2. Describe common diseases of cattle 	<ol style="list-style-type: none"> 1. Identify healthy and unhealthy animals 2. Identify common diseases of cattle 	<p>Interactive lecture: Healthy Animals</p> <p>Activity</p> <ul style="list-style-type: none"> • Visit to Veterinary Hospital/ Veterinary Dispensary to observe symptoms of unhealthy animals
Describe milk and milk products	<ol style="list-style-type: none"> 1. Define milk 2. Describe the sources of milk 3. Describe the components of milk- water, fat, lactose, casein, proteins, minerals, etc. 4. Describe the physical properties of milk- colour, flavor, density, specific gravity, foaming, viscosity, specific heat, etc 5. Describe the chemical properties of milk-pH, electrical conductivity, etc 6. Classify milk products 	<ol style="list-style-type: none"> 1. Differentiate between variety of milk 2. Differentiate between butter and cream 3. Identify various milk products 4. Prepare common milk products 	<p>Interactive lecture: Milk and Milk Products</p> <p>Activity:</p> <ul style="list-style-type: none"> • Visit to Dairy Processing Unit to understand hygiene & procedural aspects of preparation of milk products
Describe the importance and scope of fish culture	<ol style="list-style-type: none"> 1. Describe the importance of fish culture 2. Describe the various types of fish culture- pond, etc. 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of fish culture 	<p>Interactive lecture: Fish Culture</p> <p>Activity:</p> <ul style="list-style-type: none"> • Visit fish pond and discuss the various aspects of fish culture

Unit Code : AG107-NQ2014			
Unit 7 Title : Introduction to Occupational Safety and Appropriate Technology (Duration: 15 hours)			
Location : Classroom and Agricultural Farm			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe various common hazards and risks to the farmers	1. State various causes of hazards in agriculture while using toxic agro-chemicals, tools, equipment and machinery	1. Identify and enlist hazards associated with agro-chemicals, tools and machinery	Interactive lecture: Hazards in Agriculture Activity: • Videos or case studies with regard to common hazards and risks at agriculture farm
Locate hazards and identify health related problems in an agriculture farm	1. Describe the possible health related problems at agriculture farm 2. Enlist the hazardous substances at agriculture farm	1. Enlist health related problems that may occur at an agricultural farm (eg. summer stroke, cold and cough in winters/allergic problems, asthmatic conditions) 2. Demonstrate the knowledge of dealing with health related problems 3. Identify the Personal protective equipments (clothing, gloves, leg protection, etc) used in agriculture farms 4. Demonstrate the knowledge of safety system in agriculture farms 5. Assess the risk 6. Determine the likelihood of an incident	Interactive lecture: Health Hazards in Agriculture Activity: • Videos or case studies with regard to health hazards at agriculture farm
Demonstrate the knowledge for applying safe work practices in agriculture farm	1. Describe the safety measures should be observed at the agriculture farm 2. Describe how one should be aware and handle emergency situations 3. Describe the procedure for maintaining tools and equipment in good condition and using them according to the manufacturers' instructions	1. Identify to whom to report in different emergency situations 2. Demonstrate the knowledge of handling emergencies if possible at odd hours or non-availability of concerned person e.g. fire, flood, spread of infectious disease in the livestock farm, snake bite, pesticide exposures, etc.	Interactive lecture: Safe work Practices in Agriculture Farm Activity: • Organizing talks, demo, video sessions, etc.

Describe the importance of appropriate technology in agriculture	1. Describe some examples wherein technology has been applied for capital saving, promoting sustainable agriculture, etc.	1. Demonstrate the knowledge of impact of various technologies in agriculture (for example use of tractors in place of bullock driven ploughs, use of tractors in place of bullock driven carts for transportation of raw materials and agricultural produce	<p>Interactive lecture: Appropriate Technology in Agriculture</p> <p>Activity:</p> <ul style="list-style-type: none"> • Case studies
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Unit Code : AG108-NQ2014			
Unit 8 Title: Marketing of Agricultural Produce (Duration: 15 hours)			
Location : Classroom, Agricultural Farm and Market Places			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe importance of Market for agricultural Produce	1. Describe importance of market of Agricultural Produce e.g. wheat, paddy, pulses, etc. to facilitate farmers in selling their agricultural produce.	1. List of benefits of markets for farmers in selling their agricultural produce.	<p>Interactive lecture Importance, strategies and role of different stake holders in marketing of agricultural produce.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Interaction with farmers by organizing special discussion session.
Demonstrate knowledge of various strategies and chains to facilitate farmers in selling the agricultural produce for better returns.	1. Describe various strategies and market change for agricultural produce e. g. role of cooperatives, small and commercial market places, local mandis, etc.	1. List out strategies and market chains for selling agricultural produce. 2. Describe role of various agencies involved in agricultural marketing.	<p>Interactive lecture Agricultural marketing with respect to role of cooperatives and other market channels.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Videos of markets, organizing interactive sessions with farmers. • Visits to market places for selling of agricultural produce.
Demonstrate knowledge for factors responsible for market of agricultural produce	1. Factors responsible for market fluctuations for agricultural produce e.g. location, time span, number of commodities, margin in different crops.	1. Enlist factors responsible for fluctuations in small and large scale markets.	<p>Interactive lecture Market fluctuations and factors responsible for good economic returns by appropriate market strategies for selling agricultural produce.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Developing table for different crops, market chains and returns.

Describe the factors affecting demand and supply of agricultural produce.	<ol style="list-style-type: none"> 1. Explain concept of demand and supply and better economic returns. 2. Describe different factors affecting demand and supply plan of food grains, pulses, oil seed crops, cash crops (sugarcane, cotton, etc.). 	<ol style="list-style-type: none"> 1. List out factors affecting demand and supply of agricultural produce such as food grains, pulses, oil seed crops, cash crops (sugarcane, cotton, etc.). 	<p>Interactive lecture on principles of demand and supply of agricultural produce and concept of demand curve.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Case studies in relation to different crops.
Estimation of cost, margins and price variations of different agricultural produce.	<ol style="list-style-type: none"> 1. Describe the concept of margins and cost benefit ratio of different crops. 	<ol style="list-style-type: none"> 1. Estimate cost benefit ratio of different crops on the basis of production cost and net profit (margin). 	<p>Interactive lecture Cost benefit ratio and its use in calculating better economic returns.</p> <p>Activity:</p> <ul style="list-style-type: none"> • Undertaking survey to study of cost, margin and price variations in different crops.

NSQF Level 2 (Class 10)

<p>Unit Code : AG201-NQ2014 Unit 1 Title: Applied Agricultural Practices (Duration: 25 hours) Location : Classroom and Field</p>			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe the importance of crop production as a part of agricultural practice in Indian economy	<ol style="list-style-type: none"> 1. Explain the importance of crop production as a source of livelihood and increasing agricultural production 2. Describe the present status of major crops in India 3. Describe the advantages of use of modern technology in agricultural practices in India 	<ol style="list-style-type: none"> 1. Identify the crop plants with their varieties 2. Demonstrate the knowledge of crop production in Indian economy 3. Demonstrate the knowledge of modern agricultural practices 	<p>Interactive lectures Role of crop production as a part of agricultural practice in Indian economy</p> <p>Activity</p> <ul style="list-style-type: none"> • Case study • Project work
Classify field crops based on their utility viz., carbohydrate, proteins, oil, fiber and fodder	<ol style="list-style-type: none"> 1. Describe the major crops viz. cereals, pulses, oil seeds fiber & fodder crops 2. Enlist the nutritional content of major crops 	<ol style="list-style-type: none"> 1. Tabulate the major crops grown in different regions of India 2. Identify major crops through seed, live sample, photographs 	<p>Interactive lecture on major field crops based on their utility</p> <p>Activity:</p> <ul style="list-style-type: none"> • Herbarium preparation • Field demonstration
Demonstrate the knowledge of different soil	<ol style="list-style-type: none"> 1. Explain pH, salinity, cation exchange capacity, organic 	<ol style="list-style-type: none"> 1. Determination of pH 2. Diagrammatic presentation of soil 	<p>Interactive lecture Soil properties</p>

chemical properties viz. , pH, texture structure water holding capacity (WHC) types of soil water, soil micro-organisms	matter and C:N Ratio and its importance for agricultural soil 2. Describe different soil beneficial micro-organisms	texture and structure 3. Identify soil microorganism 4. Demonstrate the knowledge of three main types of soil water (gravitational water, capillary water, and hygroscopic water)	Activity • Determination of pH • Field demonstration
Demonstrate the knowledge of water management in crop production	1. Describe critical stages for irrigation 2. Describe importance of drainage	1. Demonstrate the knowledge of different methods of irrigation 2. Prepare schedule of irrigation	Interactive lecture Water Management in crop production Activity • Field demonstration and video
Demonstrate the knowledge of weed management	1. Describe importance of weed management in crop production. 2. Describe different methods of weed management	1. Identify important weeds of major crops 2. Demonstrate the knowledge of different weed control methods	Interactive lecture Weed Management Activity: • Herbarium preparation • Spot identification
Describe function of different essential nutrients and recommendation of nutrients for major crops of the region	1. Describe the nutrients as primary, secondary and micro 2. What are the recommendations of major crops viz. , wheat, rice, gram, soybean, sugarcane, cotton and fodder crops?	1. Enlist different nutrients with their functions 2. Prepare a list of recommended doses of nutrients for major crops	Interactive lectures Nutrient management Activity: • Field demonstration • Case study

Unit Code : AG202-NQ2014

Unit 2 Title: Introduction to Quality of Seeds and Seed Treatment (Duration: 25 hours)

Location : Classroom and Field

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of importance of quality seed and crop improvement	1. Explain difference between grain and seed 2. Explain importance of quality seed in relation to good crop production	1. Select/segagate seeds on the basis of quality indicators. 2. Enlist the factors affecting seeds and low crop production 3. Enlist the factors responsible for good crop production by using quality seeds	Interactive lecture Importance of quality seeds in crop production and crop improvement. Activity: • Segregation of quality seeds. • Interactive sessions with farmers on using quality seeds •

Demonstrate the knowledge of seed treatment	<ol style="list-style-type: none"> 1. Describe the methods of seed treatment against pests and diseases 2. Explain the common seed treatment method adopted for different crops (Rice, sugarcane, tomato, Sunflower, etc) 3. Explain the precautions taken when handling treated seed 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of seed treatment 2. Differentiate between healthy and diseased/ undiseased seeds 	<p>Interactive lecture Seed treatment</p> <p>Activity:</p> <ul style="list-style-type: none"> • Field demonstration • Video on seed treatment
Describe effective seed storage practices to maintain quality of seed	<ol style="list-style-type: none"> 1. Explain seed storage 2. Describe the general principles of seed storage 3. Differentiate between desirable and undesirable seed storage practices 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of good seed storage practices 2. Enlist the types of storage requirements 	<p>Interactive lecture Storage practices for maintaining quality of seeds</p> <p>Activity</p> <ul style="list-style-type: none"> • Preparation of Herbarium of desirable and undesirable seeds • Preparation of charts showing warehouses for seeds storage. • Video session on storage of seeds/grain.

Unit Code : AG203-NQ2014

Unit 3 Title: Introduction to Integrated Pest Management (IPM) (Duration: 25 hours)

Location : Classroom and Field

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Integrated Pest Management (IPM)	<ol style="list-style-type: none"> 1. Describe the principles of IPM 2. Describe the methods of pest management 3. Explain the role of IPM in modern agriculture. 4. Explain IPM in different crop ecosystems 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of IPM 2. Enlist important pests of cotton, paddy, pulses, sugarcane, and vegetables and mention their control measures 	<p>Interactive lecture Integrated Pest Management</p> <p>Activity: Preparation of project report of important pests of major crops of your area</p>
Demonstrate the importance of cultural practices in IPM	<ol style="list-style-type: none"> 1. Explain cultural practices in IPM 2. Explain principles of various cultural practices help in reducing pest incidence 	<ol style="list-style-type: none"> 1. Enlist various cultural practices adopted by the farmers of your area 	<p>Interactive lecture Importance of cultural practices in IPM</p> <p>Activity</p> <ul style="list-style-type: none"> • Field visit
Demonstrate the utility of mechanical methods in IPM	<ol style="list-style-type: none"> 1. Describe various mechanical methods helpful to combat pests of major crops 	<ol style="list-style-type: none"> 1. Preparation of chart depicting mechanical methods useful to check the 	<p>Interactive lecture Utility of mechanical methods in IPM</p> <p>Activity:</p> <ul style="list-style-type: none"> • On the spot identification

	2. Explain mechanical methods work against the pest activity	major pests of important crops	of various mechanical tools used against pests
Describe the importance and role of biological control of pests	1. Explain biological control of pests 2. State the agents of biological control	1. Enlist and identify important biological agents of major pests, their use and conservation	Interactive lecture Biological control and importance of biological control agents. Activity: <ul style="list-style-type: none"> On the spot identification of natural enemies in the field
Demonstrate the knowledge of use of chemicals in IPM, their benefits and harmful effects	1. Explain different types of pesticides and their common trade names 2. Application of solid formulations of pesticides 3. Explain the use of fumigants in store and at home 4. Describe the procedure of recognition of pesticides as per their formulations and application	1. Enlist important and popular pesticides being used in your area on major crops 2. Enlist the precautions while using pesticides 3. Demonstrate the knowledge of how liquid pesticides are dissolved in water and used on crops	Interactive lecture Use of pesticides Activity: <ul style="list-style-type: none"> Visit to local pesticide dealer to know packing and formulations of pesticides Live demonstration of preparation of pesticide solutions
Demonstrate the knowledge of pesticide application equipments	1. Describe types of sprayers and dusters and their use 2. Explain the procedure of handling and maintenance of sprayers	1. Demonstrate the knowledge of operation and minor maintenance of commonly used sprayers	Interactive lecture Pesticide application equipments Activity: <ul style="list-style-type: none"> Handling and live demonstration of commonly used sprayers

Unit Code : AG204-NQ2014

Unit 4 Title: Introduction to Micro-irrigation (Duration: 25 hours)

Location : Classroom and Field

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Micro-irrigation	1. Describe the importance of micro-irrigation in water saving 2. Describe the basic design and working principle of micro-irrigation 3. State the advantages and disadvantages of micro-irrigation	1. Demonstrate the working of commercial drip irrigation System and self made drip irrigation system	Interactive lecture Micro-irrigation Activity: <ul style="list-style-type: none"> Field visit

Describe précised water saving technology (sprinkler and drip irrigation)	<ol style="list-style-type: none"> 1. Describe the working principle of sprinkler and drip irrigation technology 2. Describe the benefits in labour saving using sprinkler and drip irrigation 3. Differentiate between sprinkler irrigation and drip irrigation 4. Explain the advantages of sprinkler irrigation 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of water saving in sprinkler irrigation 2. Demonstrate the knowledge of labour saving using sprinkler irrigation 3. Demonstrate the knowledge of using sprinkler irrigation in undulating area 	<p>Interactive lecture Importance of sprinkler and drip irrigation</p> <p>Activity</p> <ul style="list-style-type: none"> • Field visit for demonstration
Awareness about occupational health and safety measures at agriculture field in relation to micro irrigation	<ol style="list-style-type: none"> 1. Describe health and safety measure in relation to micro irrigation at agriculture field 2. State the precautions to be adopted during the operation of micro irrigation tools and equipment 	<ol style="list-style-type: none"> 1. Enlist safety practices at agriculture field 2. Enlist precautions while using tools and equipment of micro irrigation system 	<p>Interactive lecture Occupational health and safety measures at agriculture field in relation to micro irrigation</p> <p>Activity</p> <ul style="list-style-type: none"> • Demonstration of safety precautions

Unit Code : AG205-NQ2014

Unit 5 Title: : Introduction to Animal Husbandry Practices - Handling, Housing and Feeding
(Duration: 25 hours)

Location : Classroom/Dairy farm/Poultry farm/Agricultural farm/Veterinary Hospital/Dispensary

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of housing system of animals	<ol style="list-style-type: none"> 1. Describe the criteria for selection of site to establish animal house 2. Describe ideal animal house 3. Compare various types of animal houses 4. Explain suitability of animal house 5. Describe poultry house 6. State advantages and disadvantages of different types of animal houses 7. State advantages and disadvantages of different types of poultry houses 	<ol style="list-style-type: none"> 1. Identify and enlist types of animal houses 2. Demonstrate the knowledge of selection of site for animal and poultry houses 3. Enlist norms for an ideal animal house 4. Enlist types of poultry houses 	<p>Interactive lecture Housing system of animals</p> <p>Activity</p> <ul style="list-style-type: none"> • Dairy farm visit to observe various types of houses • Poultry farm visit to observe types of poultry houses • Draw plan for various types of animal houses • Design poultry house

Describe feed and water management for livestock	<ol style="list-style-type: none"> 1. Describe various types of feeds 2. Classify animal feed 3. Define balanced diet 4. Define various technical terms related to animal feeding 	<ol style="list-style-type: none"> 1. Identify and select feed for animals 2. Differentiate between legume and non-legumes 3. Demonstrate the knowledge of assessing the quality of drinking water of animals 	Interactive lecture Feed and water management for livestock Activity <ul style="list-style-type: none"> • Agricultural farm visit to identify various types of fodder • Prepare balance diet
Describe characteristic features of animals	<ol style="list-style-type: none"> 1. Explain methods of identification of different species of animals 2. Compare the suitability of method of identification according to the species of animal 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of appropriate methods of identification for different species of animals 2. Identify animals 	Interactive lecture Characteristic features of animals Activity <ul style="list-style-type: none"> • Farm visit to observe various methods of identification
Explain restraining in animals.	<ol style="list-style-type: none"> 1. Describe the methods of restraining 	<ol style="list-style-type: none"> 1. Identify restraining methods 2. Enlist restraining methods according to their use 3. Demonstrate the knowledge of appropriate methods of restraining for different species of animals 	Interactive lecture Restraining in animals Activity <ul style="list-style-type: none"> • Demonstration of restraining of animals • Hands on training to restrain animals
Demonstrate the knowledge of casting animals	<ol style="list-style-type: none"> 1. Describe the methods of casting animals 	<ol style="list-style-type: none"> 1. Identify casting method used for livestock 2. Demonstrate the knowledge of appropriate methods of casting for different species of animals 	Interactive lecture Casting Animals Activity <ul style="list-style-type: none"> • Demonstration of casting of animals • Hands on training to cast animals
Describe grooming of animals	<ol style="list-style-type: none"> 1. Describe methods of grooming 	<ol style="list-style-type: none"> 1. Identify the methods of grooming animals 2. Demonstrate the knowledge of appropriate methods of grooming for different species of animals 	Interactive lecture Grooming of animals Activity <ul style="list-style-type: none"> • Demonstration of grooming of animals • Hands on training to groom animals
Describe the importance of castration of bulls	<ol style="list-style-type: none"> 1. Describe the method of castration 2. State advantages of castration 	<ol style="list-style-type: none"> 1. Enlist the method of castration 2. Identify animals to be castrated 3. Demonstrate the knowledge of appropriate time for castration 	Interactive lecture Castration of bulls Activity <ul style="list-style-type: none"> • Visit/video session on demonstration of castration

Unit Code : AG206-NQ2014			
Unit 6 Title: Introduction to Animal Husbandry Practices - Disease Management (Duration: 25 hours)			
Location : Classroom/ Dairy farm/ Veterinary Hospital			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Identify different types of animal diseases	<ol style="list-style-type: none"> 1. Enlist various animal diseases 2. Describe the symptoms of common animal diseases 	<ol style="list-style-type: none"> 1. Identify diseases in animals 	Interactive lecture Different types of animal diseases Activity: <ul style="list-style-type: none"> • Visit to dairy farm to identify various diseases
Describe the preventive measures to be taken against infectious and non-infectious diseases	<ol style="list-style-type: none"> 1. Describe the preventive measures taken against infectious and non-infectious diseases in animals 2. Differentiate between infectious, non-infectious and contagious diseases 3. Differentiate between animal suffering from infectious and non-infectious diseases 	<ol style="list-style-type: none"> 1. Enlist various preventive measures to be taken against animal diseases 	Interactive lecture Preventive measures against infectious and non-infectious diseases Activity <ul style="list-style-type: none"> • Visit to dairy farm to identify various diseases preventive measures to be taken against infectious and non-infectious diseases
Describe the utility of first aid and disinfectants	<ol style="list-style-type: none"> 1. Describe first aid used in animal husbandry 2. Explain the importance of first aid and disinfectants 	<ol style="list-style-type: none"> 1. Identify first aid and disinfectants used in animal husbandry 2. Demonstrate the knowledge of utility of first aid and disinfectants 	Interactive lecture First aid and disinfectants in animal husbandry Activity <ul style="list-style-type: none"> • Visit to dairy farm to identify various diseases • Visit to Veterinary Hospital to demonstrate the techniques to give medicine
Demonstrate the knowledge of techniques to give medicines to animals	<ol style="list-style-type: none"> 1. Describe various techniques to give medicines 2. State the precautions to be adopted using different techniques to give medicines to animals 	<ol style="list-style-type: none"> 1. Identify various techniques to give medicine to animals 2. Demonstrate the knowledge of various techniques to give medicines to animals 	Interactive lecture Medication Techniques Activity <ul style="list-style-type: none"> • Visit to Veterinary Hospital to demonstrate the techniques to give medicine
Describe management of hygiene on dairy farm	<ol style="list-style-type: none"> 1. Describe good dairy farm practices 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of management of hygiene on a dairy farm 	Interactive lecture Management of hygiene on dairy farm Activity <ul style="list-style-type: none"> • Field Visit

NSQF Level 3 (Class 11)

Unit Code : AG301-NQ2014			
Unit 1 Title: Introduction to Paddy Cultivation (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of types of rice cultivation and its growing regions and seasons	<ol style="list-style-type: none"> 1. Describe the importance of rice to Indian Economy 2. Describe different rice cultivation conditions 3. State the rice growing regions of India 	<ol style="list-style-type: none"> 1. Identify the nutritional value of rice 2. Enlist different type of rice cultivation 3. Enlist major rice growing states of India 4. Enlist rice growing seasons of India 	<p>Interactive lectures Types of rice cultivation and its growing regions and seasons</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstrations
Demonstrate the knowledge of Ploughing harrowing and leveling for crop establishment	<ol style="list-style-type: none"> 1. Describe the method of ploughing 2. Describe harrowing 3. Explain leveling 	<ol style="list-style-type: none"> 1. Identify and enlist different types of ploughing 2. Demonstrate the knowledge of different types of harrowing and its method 3. Enlist the advantages of leveling 	<p>Interactive lectures Land Preparation</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstration
Demonstrate the knowledge cultivation methods of sowing/ transplanting/ SRI method, hybrid rice, aromatic rice, aerobic rice and boro rice cultivation	<ol style="list-style-type: none"> 1. Describe direct seeded rice 2. Explain the improved <i>Biasi</i> method of rice cultivation 3. Describe the method of line sowing of paddy 4. Explain rice transplanting 5. Describe the System of Rice Intensification (SRI) method, hybrid rice, aromatic rice, aerobic rice and boro cultivation 	<ol style="list-style-type: none"> 1. Explain the method of sowing through direct seeding. 2. Demonstrate the knowledge of improved <i>Biasi</i> cultivation 2. Calculate seed rate for line sowing 3. Explain different methods of transplanting 4. Difference amongst SRI, hybrid rice, aromatic rice, aerobic rice and boro rice cultivation in relation to seed rate, planting geometry 5. Enlist some important varieties suitable for SRI, hybrid rice, aromatic rice, aerobic rice and boro rice 	<p>Interactive lecture Methods of rice cultivation</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstration of <i>Biasi</i>, Line sowing, transplanting and SRI • Familiarisation of different rice varieties

Demonstrate the knowledge of Growth stages of Rice	1. Describe the growth stages of rice (Seedling, Vegetative, Reproductive and Ripening)	1. Demonstrate the knowledge of growth stages of rice 2. Demonstrate the knowledge of Early, Medium & Late varieties in relation to Seedling, Vegetative, Reproductive and Ripening stages of paddy	Interactive lectures Growth stages of Rice Activity • Field demonstration • Video Sessions
Demonstrate the knowledge of Implements / machinery required for paddy cultivation	1. Describe the Implements required for land preparation 2. State the Implements required for direct seeded and line sowing rice 3. State the machinery required for paddy transplanting – rotavator, paddy transplanter	1. Enlist implement for land preparation 2. Enlist implement for direct seedling and line sowing 3. Demonstrate the knowledge of various types of paddy transplanter	Interactive lectures Machinery required for paddy cultivation Activity • Field demonstrations

Unit Code : AG302-NQ2014

Unit 2 Title: Rice Varieties in India (Duration: 15 hours)

Location : Classroom and Field

Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of varieties of rice and different areas, production and productivity of rice	1. Describe area, production and productivity of rice 2. Explain high yielding varieties of rice (HYV) 3. Describe hybrid rice 4. Describe about aromatic rice 5. Explain aerobic rice	1. Compare the area, production and productivity of different rice growing states in India 2. Enlist some high yielding varieties (with duration and yield) 3. Demonstrate the knowledge of promising hybrid rice varieties (with duration and yield) 4. Demonstrate the knowledge of promising aromatic varieties (with duration and yield) 5. Demonstrate the knowledge of promising aerobic varieties (with duration and yield)	Interactive lectures Varieties of rice and different areas of rice production in India Activity • Field demonstrations

Demonstrate the knowledge of importance and method of seed production	<ol style="list-style-type: none"> 1. Explain importance and method of Breeder seed, Foundation seed and Certified seed 2. Describe the importance of isolation distance and roguing 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of seed standards, genetic purity of breeder seed, foundation seed and certified seed 2. Explain the importance and use of Hybrid rice/and High Yielding Varieties(HYV) 3. Explain the need of isolation distance and Roguing at different stages of the crop 	<p>Interactive lectures Techniques and precautions undertaken in seed production of breeder, foundation and certified seeds of varieties and hybrids</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstrations
Demonstrate the knowledge about the yield, maturity quality traits and resistance to biotic and abiotic stresses of different varieties and hybrids	<ol style="list-style-type: none"> 1. Describe the traits responsible for yield of different varieties and their suitability against to diseases, pests and drought 	<ol style="list-style-type: none"> 1. Explain identification traits of varieties resistant to diseases, pest and drought situations 	<p>Interactive lectures Yield , quality and resistant traits of different varieties and hybrids of rice under cultivation in different agro climatic conditions of India</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstrations
Describe the varieties of rice suitable to overcome the malnutrition problem	<ol style="list-style-type: none"> 1. Describe best varieties with high iron/ zinc/ vitamin 'A' 2. Explain the varieties of red rice 	<ol style="list-style-type: none"> 1. Identify some rice varieties with high iron, zinc and vitamin 'A' 2. Enlist popular red rice varieties in India 	<p>Interactive lectures Varieties of rice suitable to fight against malnutrition</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstrations

<p>Unit Code : AG303-NQ2014 Unit 3 Title: Nursery Preparation (Duration: 25 hours) Location : Classroom and Field</p>			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of site and size of nursery and seed rate and seed treatment (HYV & Hybrids)	<ol style="list-style-type: none"> 1. Describe different types of Nursery 2. Describe the suitable/ideal place for nursery preparation 3. Explain improved nursery 4. Describe seed rate for HYV and hybrids 5. Define seed treatment 	<ol style="list-style-type: none"> 1. Identify various types of nursery 2. Enlist the different criteria suitable for nursery preparation 3. Demonstrate the knowledge of proper nursery bed preparation 4. Demonstrate the knowledge of calculation of per sq.mt. area of nursery for seed sowing 5. Enlist different seed treatment 	<p>Interactive lectures Nursery Preparation</p> <ul style="list-style-type: none"> • Field demonstrations

Describe the methods of nursery preparation and compost/ nutrient application	<ol style="list-style-type: none"> 1. Describe Ploughing 2. Explain Incorporation of FYM/ compost/ fertilizer and micronutrients 3. Describe different seed sowing methods 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of ploughing depth 2. Estimation of doses of NPK per sq.mt. of nursery bed 3. Demonstrate the knowledge of different sowing methods 	
	<ol style="list-style-type: none"> 1. State different weeds of paddy nursery 2. Explain the management of nursery against weeds through herbicides 	<ol style="list-style-type: none"> 1. Identify and enlist different weeds of paddy nursery 2. Enlist name of the herbicides with doses 	Interactive lectures Weed Management Activity <ul style="list-style-type: none"> • Field demonstrations
Demonstrate the knowledge of Pest/ disease management	<ol style="list-style-type: none"> 1. Describe bird and rodent damage control 2. Describe different pests 3. State different diseases 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of different bird and rodent damage control methods 2. Demonstrate the knowledge of insecticides and its applicable doses 3. Demonstrate the knowledge of fungicides and its application 	Interactive lectures Pest and Disease Management Activity <ul style="list-style-type: none"> • Field demonstrations
Describe the methods of Land Preparation (general)	<ol style="list-style-type: none"> 1. Describe the methods of ploughing, puddling and leveling 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of time of ploughing, harrowing and leveling 2. Enlist the benefits of leveling 3. Demonstrate the knowledge of best soil for puddling 	Interactive lectures Methods of Land Preparation Activity <ul style="list-style-type: none"> • Field demonstrations
Demonstrate the knowledge of water application for land preparation	<ol style="list-style-type: none"> 1. Describe different methods of irrigation and time duration 	<ol style="list-style-type: none"> 1. Identify different methods of irrigation and time duration 2. Demonstrate the knowledge of adequate water level 3. 	Interactive lectures Water application for land preparation Activity <ul style="list-style-type: none"> • Field demonstrations
Demonstrate the knowledge of Bund preparation to protect, extra water seepage, clean the bunds	<ol style="list-style-type: none"> 1. Describe different methods of bund preparation according to field conditions 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of preventing from rodents burrowing 	Interactive lectures Bund Preparation Activity <ul style="list-style-type: none"> • Field demonstrations for chemical doses
Demonstrate the knowledge of farm implements	<ol style="list-style-type: none"> 1. State the implements for ploughing, puddling and leveling 	<ol style="list-style-type: none"> 1. Identify and enlist the implements for ploughing and puddling 2. Demonstrate the knowledge of Laser leveler 	Interactive lectures Farm Implements Activity <ul style="list-style-type: none"> • Field demonstrations

Unit Code : AG304-NQ2014			
Unit 4 Title: Seedling Management and Transplantation/Crop Establishment (Duration: 25 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of selection of appropriate site for nursery growing	<ol style="list-style-type: none"> 1. Describe types of site selected for nursery 2. Define the criteria on the basis of which site is selected for nursery preparation 3. Describe the quality of best site 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of proper site selection for nursery 2. Demonstrate the knowledge of quality of best site 	Interactive lecture Selection of appropriate site for nursery growing Activity <ul style="list-style-type: none"> • Use of charts for selection of site • Field demonstration
Describe Nursery management, healthy seedling management for water nutrient and diseases during nursery period	<ol style="list-style-type: none"> 1. Explain healthy seedling 2. Describe nursery management for water nutrient and diseases 	<ol style="list-style-type: none"> 1. Identify healthy seedling 2. Enlist various ways for management of nursery for water nutrient and diseases 	Interactive lecture Nursery management and seedling management Activity <ul style="list-style-type: none"> • Field demonstration
Demonstrate the knowledge of rejection of improper nursery and age of seedling for transplanting	<ol style="list-style-type: none"> 1. Describe the method for rejection of nursery plants 2. Explain age of seedling suitable for transplanting 3. Describe seedling age and yield losses 	<ol style="list-style-type: none"> 1. Identify improper nursery 2. Demonstrate the knowledge of proper age of seedling for transplanting 3. Demonstrate the knowledge of yield losses with late sowing 	Interactive lecture Rejection of improper nursery and age of seedling for transplanting Activity <ul style="list-style-type: none"> • Field demonstration
Demonstrate the knowledge of transport of seedling to right place	<ol style="list-style-type: none"> 1. Describe the means used for transportation of seedling 2. State the precautions should be taken during transport of seedling to right place 	<ol style="list-style-type: none"> 1. Enlist different ways and means of transportation of seedlings from nursery to planting field . 2. Enlist different precautions under taken during transportation of seedlings 	Interactive lecture transportation of seedlings Activity <ul style="list-style-type: none"> • Field demonstration
Demonstrate the knowledge of transplanting procedures of seedling field	<ol style="list-style-type: none"> 1. Describe different methods of transplanting seedling 2. Describe repair of field for transplanting 	<ol style="list-style-type: none"> 1. Identify different methods of transplanting 2. Demonstrate the knowledge of field preparation 	Interactive lecture Transplanting procedures of seedling field Activity <ul style="list-style-type: none"> • Field demonstration
Demonstrate the knowledge of method of transplanting	<ol style="list-style-type: none"> 1. Describe Line transplanting (spacing, number of plants per hill, 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of spacing maintained for line 	Interactive lectures Method of transplanting

and precaution during transplanting	variety/ hybrid) 2. State different types of spacing for transplantation 3. Describe synchronous transplanting 4. Explain Pure seedling	transplanting 2. Demonstrate the knowledge of calculating per square meter plant population in nursery 3. Enlist different types of spacing 4. Enlist the benefits of synchronous transplanting (irrigation and pest incidence)?	Activity • Field demonstration
Demonstrate the knowledge of Direct Seeded	1. Describe proper puddling and leveling of fields 2. State the advantages and limitations of Direct Seeding	1. Demonstrate the knowledge of preparation of field under direct seeded condition	Interactive lectures Direct Seeded Activity • Field demonstrations

Unit Code : AG305-NQ 2014 Unit 5 Title: Water Management (Duration: 10 hours) Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe Irrigation Management	1. Describe best irrigation method suited to variety of paddy as per water availability 2. Explain water management at different water depth at different stages of crop 3. Describe alternative wetting and drying	1. Demonstrate the knowledge various factors related to water loss, water depth at different growing stages of paddy 2. Demonstrate the role of water / optimum moisture required for tillering, panicle initiation and grain filling	Interactive lecture Irrigation Management Activity • Field demonstrations
Describe water use efficiency	1. Describe the points to maximize water use efficiency	1. Demonstrate the knowledge of Paddy bunds field level, puddling and time of harvesting	Interactive lecture Water use efficiency Activity • Field demonstrations

Unit Code : AG306-NQ2014 Unit 6 Title: Integrated Nutrient Management (Duration: 20 hours) Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Soil Sampling	1. Describe various procedures of soil sampling	1. Demonstrate the knowledge of collecting soil as per	Interactive lecture Soil Sampling

	<ol style="list-style-type: none"> 2. State various nutrients that are analyzed 3. Describe the components of soil analysis report 	<p>the recommended sampling procedures from field</p> <ol style="list-style-type: none"> 2. Demonstrate the knowledge of procedures to dry the soil and prepare sample 	<p>Activity</p> <ul style="list-style-type: none"> • Field demonstration • Practical (self performance)
Demonstrate the knowledge of testing for macro and specific micro nutrient in soil	<ol style="list-style-type: none"> 1. Describe types of soil and their advantages & disadvantages with reference to the nutrient status 2. Explain various methods of land preparation to maintain soil tilth and nutrient status 	<ol style="list-style-type: none"> 1. Explain various methods of soil testing for macro and micronutrients. 2. Collection of soil samples for testing 	<p>Interactive lecture Soil testing methods for macro and micro nutrients</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstration • Practical on soil testing.
Demonstrate the knowledge of application of organic and inorganic fertilizers	<ol style="list-style-type: none"> 1. Describe the selection criteria and procedure of appropriate organic and inorganic fertilizers 2. State the use of organic manures 3. Explain various cultural practices that enhance the soil nutrient status 	<ol style="list-style-type: none"> 1. Identify appropriate organic and inorganic fertilizers 2. Enlist different types of bio-fertilizers and green manures 3. Demonstrate the knowledge of use of various culture practices that enhance the soil 	<p>Interactive lecture Application of organic and inorganic fertilizers</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstration
Describe the methods of application of various fertilizers and micronutrients	<ol style="list-style-type: none"> 1. Describe the appropriate methods of application of various fertilizers and micronutrients 	<ol style="list-style-type: none"> 1. Identify appropriate method of application of various fertilizers and micronutrients 2. Demonstrate the knowledge of use of various methods of various cultivars 	<p>Interactive lecture Methods of application of fertilizers and micronutrients</p> <p>Activity</p> <ul style="list-style-type: none"> • Field visit • Practical (self performance)
Demonstrate the knowledge of selection of appropriate fertilizer as per soil requirement	<ol style="list-style-type: none"> 1. Describe suitable fertilizers for supply of micronutrients 	<ol style="list-style-type: none"> 1. Select best fertilizers and micronutrients 	<p>Interactive lecture Use of different fertilizers for supply of micronutrients</p> <ul style="list-style-type: none"> • Activity preparation of posters and charts
Describe Nutrient Deficiency	<ol style="list-style-type: none"> 1. Explain the effects of nutrient on plants & deficiency symptoms of various nutrients (Nitrogen, Phosphorus, Potassium, Sulphur, Zinc and Magnesium) 	<ol style="list-style-type: none"> 1. Identify the effects of nutrient deficiency on plants 2. Demonstrate the knowledge of deficiency symptoms of various nutrients 	<p>Interactive lecture Nutrient Deficiency in Plants</p> <p>Activity</p> <ul style="list-style-type: none"> • Field demonstration

Demonstrate the knowledge of recommended dose of fertilizer	<ol style="list-style-type: none"> Describe the recommended dose of fertilizer for different varieties of paddy Explain the adverse effect of over and under dose of fertilizer 	<ol style="list-style-type: none"> Demonstrate the knowledge of recommended dose of fertilizer for different varieties of paddy 	<p>Interactive lecture Dose of fertilizer for different varieties of paddy</p> <p>Activity</p> <ul style="list-style-type: none"> Field demonstration
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Unit Code : AG307-NQ2014 Unit 7 Title: Integrated Pest Management and Disease Management (Duration: 25 hours) Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Identify major pests of paddy and symptoms of their attack	<ol style="list-style-type: none"> Describe different pests of paddy State the symptoms of pest's attack on rice plant 	<ol style="list-style-type: none"> Identify different types of pests Demonstrate the knowledge of nature of pest attack and yield losses 	<p>Interactive lecture Major pests to paddy and symptoms of their attack</p> <p>Activity</p> <ul style="list-style-type: none"> Field visits Step by step diagnosis for rice insect pest
Demonstrate the knowledge of major diseases of paddy	<ol style="list-style-type: none"> Describe different diseases of paddy State the symptoms of different diseases of paddy 	<ol style="list-style-type: none"> Identify types of diseases associated with paddy Identify crop stage and disease individual Demonstrate the knowledge of Disease Calendar Identify signs and symptoms of different diseases Identify mode of transmission 	<p>Interactive lecture Major diseases of paddy</p> <p>Activity</p> <ul style="list-style-type: none"> Field visits Step by step diagnosis for rice insect pest
Demonstrate the knowledge regarding preventive, cultural, mechanical and transgenic methods for control of pests/ insects	<ol style="list-style-type: none"> Describe cultural practices of pest control Explain seed and seedling treatment Describe chemical control method Explain Mechanical control Describe the use of transgenic varieties for pest control 	<ol style="list-style-type: none"> Identify various cultural practices of pest control Enlist resistant varieties Demonstrate the knowledge of different method of seed/ seedling treatment Demonstrate the knowledge of use of resistant varieties of rice Enlist insect-wise main chemical control Enlist the transgenic varieties of rice Identify an enlist various pheromones traps Enlist various practices for erecting bird nursery/ rice field maturity stage. Demonstrate the knowledge of different ways to control rodent in rice field/ godown/warehouses 	<p>Interactive lecture Methods of pest control</p> <p>Activity</p> <ul style="list-style-type: none"> Field visits Video

Preventive, cultural and mechanical method of diseases	<ol style="list-style-type: none"> 1. Describe the cultural practices of control diseases 2. Explain the chemical and non-chemical approaches for disease management 3. Describe seed treatment 	<ol style="list-style-type: none"> 1. Identify various cultural practices of disease control 2. Demonstrate the knowledge of seed treatment 3. Demonstrate the knowledge of various approaches of disease control viz., chemical approach and non-chemical approach 	Interactive lecture Methods of Disease Control Activity <ul style="list-style-type: none"> • Field visits • Take up planting modification
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Unit Code : AG308-NQ2014 Unit 8 Title: Weed Management (Duration: 10 hours) Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of weeds of paddy crop	<ol style="list-style-type: none"> 1. State weeds and their influence on crop yield 	<ol style="list-style-type: none"> 1. Identify narrow and broad leaf weeds 	Interactive lecture Weeds of paddy crop Activity <ul style="list-style-type: none"> • Field visit
Demonstrate the knowledge of Weed Management	<ol style="list-style-type: none"> 1. Describe weed control by herbicides pre-emergence weedicides 2. Describe Post-emergence weedicides 3. State natural ways of control of weeds 	<ol style="list-style-type: none"> 1. Enlist pre-emergence weedicides and its application dose 2. Demonstrate the knowledge of crop stages and water level for weedicides application 3. Demonstrate the knowledge of new post-emergence weedicides and application doses 4. Demonstrate the knowledge of crop stages, weed stages and water level 	Interactive lecture Weed Management Activity <ul style="list-style-type: none"> • Field visit
Demonstrate the knowledge of Weeding Implements	<ol style="list-style-type: none"> 1. Describe Conoweeder, Rotary weeder 2. Describe Sprayer with flat fan nozzle 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of different types of weeding implements used in cultivation and use of herbicides for eradication of weeds 2. enlist the conventional implements used in weeding in paddy fields 	Interactive lecture Weed Implements Activity <ul style="list-style-type: none"> • Field visit

NSQF Level 4 (Class 12)

Unit Code : AG401-NQ2014			
Unit 1 Title: Straw Management (Duration: 10 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Chemical composition, C:N ratio of rice straw and its uses	<ol style="list-style-type: none"> 1. Describe Rice straw NPK composition 2. Explain impact of C:N ratio on rice straw 	<ol style="list-style-type: none"> 1. Identify the % of NPK in rice straw 2. Demonstrate the knowledge of C:N ratio 	Interactive lectures Chemical composition of rice straw in relation to C:N ratio
Describe methods for rice straw management	<ol style="list-style-type: none"> 1. Describe various methods for decomposing rice straw for composting, 2. Explain Green manuring in field by rice straw 3. Describe Straw burning 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of decomposition of straw using <i>Trichoderma</i> 2. Demonstrate the knowledge of Green manuring with groundnut plants 	Interactive lectures Methods for rice straw management
Identify the uses of rice straw	<ol style="list-style-type: none"> 1. Describe rice straw uses for making different products - paper, ropes and packing material 	<ol style="list-style-type: none"> 1. Enlist various products prepared from rice straw 	Interactive lectures Uses of Rice Straw

Unit Code : AG402-NQ2014			
Unit 2 Title: Intercultural Operations in Paddy (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Intercultural operation during sowing and planting	<ol style="list-style-type: none"> 1. Explain <i>Biasi</i> operations in directed seeded rice - ploughing in standing fields and <i>Chalai</i> 2. Describe Gap filling in transplanted fields 	<ol style="list-style-type: none"> 1. Enlist the Advantages of <i>Biasi</i> 2. Demonstrate the knowledge of time when gap filling is carried out 	Interactive lectures Intercultural operation during sowing and planting
Demonstrate the knowledge of Intercultural operations during weeding	<ol style="list-style-type: none"> 1. Describe Manual weeding 2. Describe Mechanical weeding 3. Describe By Cono-weeder in SRI method 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of manual weeding 2. Identify different types of weeder 	Interactive lecture Intercultural operations during weeding

Unit Code : AG403-NQ2014			
Unit 3 Title: Harvesting and Storage (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Describe Harvesting, threshing and winnowing	<ol style="list-style-type: none"> 1. Explain proper stage and time of harvesting, losses of early and late harvesting 2. State various methods of threshing 3. Explain why timely harvesting and threshing is compulsory 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of appropriate stage and time of harvesting 	Interactive lectures Harvesting, threshing and winnowing
Explain Storing paddy	<ol style="list-style-type: none"> 1. Explain safe storage system 2. State losses with high moisture content 3. Describe types of storage 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of Ideal storage conditions 2. Demonstrate the knowledge of managing store grain pests 3. Demonstrate the knowledge of moisture level at storage 4. Enlist different types of storage 	Interactive lectures Storing Paddy
Describe the methods of Harvesting and Threshing	<ol style="list-style-type: none"> 1. Describe Manual harvesting by sickles 2. Describe Mechanical harvesting by reaper/combiner 3. Explain Manual harvesting by pedal thresher 4. Describe Mechanical harvesting by thresher 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of manual harvesting 2. Enlist different types of reaper and combine harvester 3. Demonstrate the knowledge of pedal thresher 4. Identify different types of thresher 	Interactive lectures methods of Harvesting and Threshing

Unit Code : AG404-NQ2014			
Unit 4 Title: Health and Safety at Workplace (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Health and safety during field operations	<ol style="list-style-type: none"> 1. Explain the harmful effects of various pesticides/ agrochemicals 	<ol style="list-style-type: none"> 1. Identify improper use of pesticides - symptoms 	Interactive lectures Health and safety during field operations
Explain Safe guards	<ol style="list-style-type: none"> 1. Describe safe methods of handling the pesticides/ agrochemicals 	<ol style="list-style-type: none"> 1. Enlist the precautions handling pesticides/ agrochemicals 	Interactive lectures Safe guards

Demonstrate the knowledge of First Aids	1. Explain First aid to the exposure of humans to harmful effects of pesticides	1. Identify type of first aid provided to control the harmful effect of pesticides	Interactive lectures First Aids
Demonstrate the knowledge of Health and safety during harvesting and threshing	1. Describe safe use of different harvesting and threshing reapers and implements	1. Demonstrate the knowledge of safe use of various reapers, threshers and harvesters	Interactive lectures Health and safety during harvesting and threshing

Unit Code : AG405-NQ2014			
Unit 5 Title: Handling Emergency Situations (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of contingent plan on the basis of monsoon situation (a) Delay in onset of monsoon	1. Describe the practices to be followed shift from long duration to short duration varieties 2. Explain sowing of paddy nursery at 15 days interval 3. Explain conservation of pre-monsoon soil moisture through soil/ straw/ grass mulching 4. Describe adoption of close spacing of plants and increasing N fertilizer rate by 20 to 25% 5. Explain adoption of SRI cultivation method	1. Demonstrate the knowledge of different activities carried out to handle the situation of delay in onset of monsoon	Interactive lectures Delay in onset of monsoon
(b) Early withdrawal of monsoon	1. Describe the practices to be followed harvesting crop at physiological maturity 2. Explain water conservation and management practices to be followed 3. Describe efficient use of stored water for lift saving irrigation 4. Explain appropriate pest and disease management	1. Demonstrate the knowledge of different activities carried out to handle early withdrawal of monsoon 2. Demonstrate the knowledge to prepare for the ensuring <i>rabi</i> season to reduce the loss	Interactive lectures Early withdrawal of monsoon

(c) Timely onset and sudden withdrawal of monsoon	<ol style="list-style-type: none"> 1. Describe the practices to be followed to avoid sowing till sufficient rains have been received 2. Explain if sowing is delayed, plant short duration varieties 3. Describe practices thin crop stand reduce plant population and use the biomass as mulch, inter-cultural operation to control the weeds in case of upland rice 4. Explain rain water conservation 5. Describe Foliar application of urea 2%, where moisture is a constraint 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of different activities carried out to handle the situation of timely onset and sudden withdrawal of monsoon 	<p>Interactive lectures</p> <p>Timely onset and sudden withdrawal of monsoon</p>
(d) Break in monsoon	<ol style="list-style-type: none"> 1. Describe the practices to be followed for water conservation (farm pond and raising bund heights) and management (life saving irrigation, thinning plant population, 2% urea spraying, etc.) 2. Describe conserving moisture for rabi sowing 3. Explain utilizing paddy fallows for second crop 4. Describe spraying Boron and potassium to increase drought tolerance 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of different activities carried out to handle the break in monsoon situation 	<p>Interactive lectures</p> <p>Break in Monsoon</p>
(e) Outbreak of disease and pest	<ol style="list-style-type: none"> 1. Describe pest and disease resistant varieties 	<ol style="list-style-type: none"> 1. Enlist important pest and disease resistant varieties 	<p>Interactive lectures</p> <p>Pest and disease resistant varieties</p>

Unit Code : AG406-NQ2014			
Unit 6 Title: Rights and Responsibilities of Paddy Worker (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Demonstrate the knowledge of Rights of paddy worker	<ol style="list-style-type: none"> 1. Explain timely agro-advisory - SMS mobile, Radio, TV, etc. 2. Describe easy procurement - e-procurement 3. State farmers' right under PPV & FRA act 2001 (9 rights) 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of type of advisory 2. Demonstrate the knowledge of e-procurement 3. Enlist different rights for farmers under the act 	<p>Interactive lectures</p> <p>Rights of paddy worker</p>
Demonstrate the knowledge of responsibilities of paddy worker	<ol style="list-style-type: none"> 1. Explain individual responsibility to increase productivity 2. Describe the techniques to save the water (natural resources) 3. Explain Eco-friendly cultivation- IPM, INM 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of productivity 2. Identify different water saving techniques 3. Demonstrate the knowledge of eco/environment friendly cultivation of paddy 	<p>Interactive lectures</p> <p>Responsibilities of paddy worker</p>

Unit Code : AG407-NQ2014			
Unit 7 Title: Paddy Marketing (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
Classify Market	<ol style="list-style-type: none"> 1. Describe Primary market 2. Describe Secondary market 3. Describe Long term (terminal market) 4. Explain weekly, daily and seasonal market 	<ol style="list-style-type: none"> 1. Enlist different type of markets 	<p>Interactive lectures</p> <p>Classification of Market</p>
Describe Market Channel	<ol style="list-style-type: none"> 1. Explain Producer to consumer 2. Describe Producer-wholesaler-retailer-consumer 3. Describe Producer-retailer-rice mill owner-commission agent-consumer 	<ol style="list-style-type: none"> 1. Enlist differ marketing channels 	<p>Interactive lectures</p> <p>Market Channels</p>
Demonstrate the knowledge of Market Cost	<ol style="list-style-type: none"> 1. Describe Transportation cost 2. Describe Loss during marketing 3. Explain Market fees (chungi) 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of components involved in market cost 	<p>Interactive lectures</p> <p>Market Cost</p>
Demonstrate the knowledge of Marketable Surplus	<ol style="list-style-type: none"> 1. Describe Planning of sale of the produce 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of Marketable Surplus 	<p>Interactive lectures</p> <p>Marketable Surplus</p>
Demonstrate the knowledge of Marketed Surplus	<ol style="list-style-type: none"> 1. Explain actual sale of the produce 	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of What is marketed surplus 	<p>Interactive lectures</p> <p>Marketed Surplus</p>
Demonstrate the knowledge of krishi upaj mandi in relation to demand and supply of rice	<ol style="list-style-type: none"> 1. Describe the role of krishi upaj mandi for price fixing 	<ol style="list-style-type: none"> 1. List the details of Krishi Upaj Mandi and Commodity market activities during visit 	<p>Interactive lectures</p> <p>Role of krishi upaj mandi in relation to demand and supply of rice</p>

Unit Code : AG408-NQ2014			
Unit 8 Title: Communication Skills at Workplace (Duration: 20 hours)			
Location : Classroom and Field			
Learning Outcome	Knowledge Evaluation	Performance Evaluation	Teaching and Training Method
<ol style="list-style-type: none"> 1. Understands meaning, concept and importance of communication skills at workplace 2. Know different types of skills required at workplace 3. Understand and respond written communication 4. Acquired all four linguistic skills i.e. writing, speaking, listening and reading skills in relation to the job role 5. Effectively communicate at workplace with supervisors and field staff including unskilled labour force 6. Handle job related technological skills in relation to communication 	<ol style="list-style-type: none"> 1. What is communication and its importance at workplace? 2. What are the different types of communication skills including value based communication and entrepreneurial skills i.e. listening to all members of the team, empathy, patience, clarity in instructions, positivity, use of respectful language (oral skills) and ability to resolve conflicts amongst team members at workplace 3. What technological skills are required at workplace and how to develop these in trainees? 4. What methods are used to develop effective communication skills in trainees required at workplace? 	<ol style="list-style-type: none"> 1. Explain communication 2. What do you understand about communication and its importance at workplace 3. Write different types of communication skills 4. Enlist four linguistic skills required for communication with example of each one related to the job role 5. Effective communication at workplace i.e. agriculture field, dairy farm, shrimp hatchery, etc. 	<ol style="list-style-type: none"> 1. Organising video and interactive sessions on communication and technological skills required at workplace 2. Showing video shots specially taken for communication at agriculture field during various field operations e.g. nursery bed preparation, transplantation and seed sowing, spraying of chemicals, application of fertilizers and manure, harrowing etc. where instructions to field staff are involved. 3. Practice sessions on writing, listening, reading and speaking skills for correct pronunciation of different implements, equipment, chemicals, crops, seeds and variety names in Hindi, English or common local specific names 4. This practice is required for clear instructions to us and semi-skilled workers at the field during farm operations

Note: Trainers are suggested to use examples and terminologies in developing and demonstrating writing, speaking, listening and reading skills related to the concerned job role/ occupation viz., Agriculture–paddy/ Sugarcane field/ Micro-irrigation enterprise/ Dairy farm/ Shrimp hatchery.

9. Assessment Guide

Assessment is a process used for determining an individual's progress or level of mastery/competence in an occupational area. It may be formative (continuous) and/or summative (final). It is a process of collecting evidence and making judgment about the extent to which a person demonstrates the knowledge and skills set out in the standards or learning outcomes of a unit of competency. Assessment should be done on the basis of information or evidence about the individual's ability against clearly stated objectives or standards. A diversity of assessment methods is required to achieve the multiple purposes and to satisfy the requirements of competency based assessment. Appropriate evidence is to be collected from activities that can be clearly related to the Units of Competency. It should cover all the elements and performance criteria/indicators in the competency standards. Student's achievements should be assessed by using the following methods of assessment.

S. No.	Method of Assessments	Weightage (Max. marks)	Evaluator
1.	Written test	30	Teacher
2.	Practical test	30	Certified Assessor #
3.	Oral test/viva voce	10	Teacher/External Examiner
4.	Portfolio	10	Teacher
5.	Project	10	Teacher/Trainer
6.	Direct Observation	10	Teacher/Trainer
Total		100	

Assessors will be certified by the State Education Board.

- Written test:** It allows candidates to demonstrate that they have the knowledge and understanding of a given topic.
- Practical test:** It allows candidates to demonstrate application of skills in simulated or real work conditions against competency standards (skill and academic standards).
- Oral test/viva voce:** It allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of oral test or viva voce.
- Portfolio:** It is a compilation of documents that supports the candidate's claim of competence that was acquired from prior learning and practical experience. Documents (including photo's, newspaper articles, reports, etc.) of practical experience in the workplace or the community and photographs of the products prepared by the candidates related to the units of competency should be included in the portfolio.
- Project:** Projects (individual or group projects) are a great way to assess the practice skills on a deadline, but these should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation.
- Direct Observation:** Direct observation requires a considerable degree of commitment from the observer and those being observed. Employability skills evaluation listed below in the table should be evaluated through direct observation by the teacher/trainer and appropriate records should be maintained for transparency in evaluation.

Employability Skill Area	S. No.	Competencies and Performance Standards	Competent	Not Yet Competent
Communication	1.	Questions appropriately		
	2.	Writes clearly and legibly		
	3.	Demonstrates good listening and responding skills		
	4.	Informs about the absence and reasons of absence		
Responsibility	5.	Organizes work		
	6.	Manages time effectively and efficiently		
	7.	Complete assignments timely		
	8.	Displays care for tools and equipment		
	9.	Accepts responsibility pleasantly		
	10.	Exhibits patience		
	11.	Demonstrates pride in work		
Interpersonal relationship	12.	Displays friendly and cooperative attitude		
	13.	Demonstrates tactfulness in difficult situations		
	14.	Accepts constructive criticism		
	15.	Exhibits positive attitude		
Health and Safety	16.	Practices good personal hygiene regularly		
	17.	Maintains good personal health		
	18.	Dresses well and in appropriate manner		
Innovation and Creativity	19.	Give reasons and make judgments objectively		
	20.	Share ideas and thoughts with others		

10. List of Tools, Equipment and Materials

The list given below is suggestive and an exhaustive list should be prepared by the teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience. Teachers should make frequent field visits to demonstrate the functioning, use and maintenance of various agricultural tools, implements and machineries.

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|-------------------------|-------------------------|
| 1. Axes | 8. Farmyard Manure |
| 2. Auger | 9. Fertilizers |
| 3. Biofertilizers | 10. Garden Hand Tools |
| 4. Chaff Cutter | 11. Garden Hoes |
| 5. Disc Harrow | 12. Garden Knife |
| 6. Drip Irrigation Unit | 13. Garden Rake |
| 7. Dutch Hand Hoe | 14. Garden/Digging Fork |

15. Garden/Digging Spade
 16. Hand Screens/Sieves
 17. Hoe
 18. Hoes
 19. Knapsack Sprayer
 20. Leaf Rake
 21. Levellers
 22. Long Handle Hoes
 23. Loppers or Pruning Saw
 24. Maize Sheller
 25. Multi Crop Thresher
 26. Offset Disc Harrows
 27. Paddy Thresher
 28. Plastics Baskets
 29. Plough
 30. Polybags (different sizes)
 31. Potato Digger
 32. Pruners
 33. Pruning Knife
 34. Pruning Shears
 35. Pumpsets
 36. Rigid Tillers
 37. Rotary Tiller
 38. Rotary Tillers
 39. Sanitizers
 40. Secateurs
 41. Seeds of various Agricultural Crops
 42. Seed Processing Machine
 43. Seed Thresher
 44. Seed Treating Equipment
 45. Seed-cum-Fertilizer Drill
 46. Shovels
 47. Specialty Spades
 48. Soil Scoop
 49. Spring Loaded Tillers
 50. Sprinkler Irrigation Unit
 51. Sprinklers
 52. Straw Reaper
 53. Tractor
 54. Trowels
 55. Vegetable Seed Extractor
 56. Vermicompost
 57. Water Hose
 58. Watering Can
 59. Zero Till Seed cum Ferti Drill
 60. PH meter, Conductivity bridge, Nitrogen analyzer, Spectrophotometer, Flame photometer
 61. Seed materials as per curriculum
 62. Fertilizer samples
 63. Seed bed preparation - spade, khudali, tape, ropes, tagadi
 64. Dusters, sprayers
 65. Soil testing kit
 66. Models of implements used in crop production
 67. Measuring cylinder, bucket, knapsack, sprayer, locally available small pack of pesticides.
 68. Pheromone trap for major insect pest available in local market.
 69. Paddy rotivator
 70. Paddy drum seedler
 71. Paddy transplanter
 72. Power tiller
 73. Power sprayer
 74. Conoweeder
 75. Improved paddy biasi plough (bushing cultivation)
 76. Tractor with seed drill
 77. Paddy cultivator & puddler
 78. Cage-wills
 79. Paddy combiner (small)
 80. Paddy reaper
 81. Paddy thresher
 82. Weighing machine
 83. Moisture meter
 84. Measuring cylinder
- Materials**
1. Seedling
 2. Fertilizers
 3. Insecticides
 4. Weedicides
 5. Fungicides
 6. Micro-nutrients

11. Teacher's Qualifications

Qualification, competencies and other requirements for Graduate Teacher on contractual basis are as follows:

Essential Qualification	Desirable Qualification	Age Limit
Graduate in Agriculture with minimum 55% marks from a recognized university/institution with 2 years experience in teaching or work experience in Agriculture related industry OR Masters degree in Agriculture related discipline from a recognized university/institution with minimum 55% marks and 1 year experience in teaching or work experience in Agriculture related industry	<ul style="list-style-type: none"> • B. Ed. • Effective communication skills (oral and written) • Basic computing skills. 	18-40 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules.

12. List of Reference Books and Instructional Material

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3. Animal Reproduction and Artificial Insemination (Reference Book), NCERT.
4. Dairy Animal Management. Instructional-cum-Practical Manual, NCERT.
5. Feeds and Feeding of Dairy Animals. Instructional-cum-Practical Manual, NCERT.
6. Milk and Milk Products. Instructional-cum-Practical Manual, NCERT.
7. Milk and Milk products - (Reference book), NCERT.
8. Poultry Husbandry, by Morlay A. Jull. Tata Mc-Graw Hill Publishing Com. Ltd., New Delhi.
9. Poultry Breeding, by Jull, M.A. Jhon Wiley and sons Inc. New York Chapman and Hall Ltd. London.
10. Poultry Production, by R.A. Singh, Kalyani Publisher, Ludhiana, Delhi.
11. Laboratory Manual on Poultry Production, by C.K. Agarwal and R.A. Singh, Haryana Agricultural University, Hisar - 125004
12. Poultry Production, by Panda, B and Mohapatra, S.C. ICAR, New Delhi.
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17. Hand Book of Agriculture, ICAR, New Delhi - 110 0016
18. India Farming, ICAR Publication, Krishi Bhavan, New Delhi - 110 001.
19. Kheti (Hindi), ICAR Publication, Krishi Bhavan, New Delhi - 110 001.
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24. Chaudhuri H.L. and Singh S.B., 1984. Induced Breeding of Carps, Published by Indian Council of Agriculture Research, New Delhi, 1-82.

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