

**Vocational Higher Secondary
Education (VHSE)**

Second Year

**AGRO MACHINERY AND
POWER ENGINEERING**

Reference Book - Teachers' Version



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT),
KERALA
2016

Foreword

Dear Teachers

This reference book (**Teachers' Version**) is intended to serve as a transactional aid to facilitate classroom transaction and as a ready reference for teachers of Vocational Higher Secondary Schools. It offers some guidelines for the transaction of the course content and for undertaking the practical work listed in the course content. As the curriculum is activity based, process oriented and rooted in constructivism focusing on the realisation of learning outcomes, it demands higher level proficiency and dedication on the part of teachers for effective transaction.

In the context of the Right- based approach, quality education has to be ensured for all learners. The learner community of Vocational Higher Secondary Education in Kerala should be empowered by providing them with the best education that strengthens their competences to become innovative entrepreneurs who contribute to the knowledge society. The change of course names, modular approach adopted for the organisation of course content, work-based pedagogy and the outcome focused assessment approach paved the way for achieving the vision of Vocational Higher Secondary Education in Kerala. The revised curriculum helps to equip the learners with multiple skills matching technological advancements and to produce skilled workforce for meeting the demands of the emerging industries and service sectors with national and global orientation. The revised curriculum attempts to enhance knowledge, skills and attitudes by giving higher priority and space for the learners to make discussions in small groups, and activities requiring hands-on experience.

The SCERT appreciates the hard work and sincere co-operation of the contributors of this book that includes subject experts, industrialists and the teachers of Vocational Higher Secondary Schools. The development of the teachers' version of reference books has been a joint venture of the State Council of Educational Research and Training (SCERT) and the Directorate of Vocational Higher Secondary Education.

The SCERT welcomes constructive criticism and creative suggestions for the improvement of the book.

With regards,

Dr. J. Prasad
Director
SCERT, Kerala

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ABOUT THE COURSE

A vocational course in agro machinery and power engineering envisages producing a pool of talented and skilled machines in agricultural sector. This skilled work force can surpass the crisis of the shortage of labours and contributed to increase in food production, through the use of modern techniques

The course so designed as to impart technical skills to teenagers and inculcate an urge in them to be friendly with the farming and nature. Agricultural, especially mechanized agriculture has prime importance in the development policies of both central and state governments and various schemes are being implemented in the content under plan fund. Students of higher secondary level and high school level need to be trained in the use of farm machinaries; they are repair and maintenance so that their tremendous strength can be utilized in food production

In the decade agricultural scenario is likely to undergo drastic changes..Maximum production from diminishing agriculture lands will be the main concern. Modern agriculture will be transform to agri –Business and investors will be focusing on maximum profit with minimum input. Employment opportunities like drivers, operators of modern machinery, mechanics, irrigation system designers entrepreneurs in utilizing renewable energy like solar energy and biomass, technicians in post harvesting, operations and seed processing will arise in plenty .

Engineering graphics and mechanical Auto Cad are also included in the syllabus which will help the students to enter into higher skill level course in future

Students accustomed with these engineering practice will definitely be the forerunners of a generation thinking seriously of preserving fresh air, pure water and greenery of our earth for the future. Hence the vocational course in agro machinery and power engineering is highly relevant

JOB ROLES (CAREER PATH)

The Agro Machinery and power Engineering course offers plenty of job opportunities in different sectors of industry, like Government Sector, Private sector Self employment etc. Some of them are listed below

Government Sector	Private sector	Self employment
<ul style="list-style-type: none"> • Tractor Mechanic • Tractor Driver, • cleaner, • Operator of Combine Harvester • Transplanter operator • Pump operator • Machine operators • Power tiller mechanic, • operator of modern implements • Workshop assistants • Mechanics • Skilled assistants in Hi-Tech farming • Opportunities are existing in 14 District Agro. Engg. Workshops of Agrl. Department, • Research testing and training center, Vellayani , • State seed farms, • Kerala Agricultural university. • KAMCO---Tiller production unit and tractor unit • Kerala Agro Industries corporation 	<ul style="list-style-type: none"> • Engineering Assistants in Private Tractor and Tiller manufacturing companies • Sales executives of dealers of Agrl. Machineries • Servicing agents in workshops of Pump set dealers • Supervisors in Irrigation companies {Drip & sprinkler} • Skilled assistants in Hi tech farming(Green Housing) 	<ul style="list-style-type: none"> • Farm Mechanics in Self help groups of GramaPanchayath • Entrepreneurs in Mechanized farming(start project and purchase machineries for own use, hiring, service providers) • Agents for Hi tech farming • Irrigation system designers for Large Agrl .Farms and mini units in local areas

MAJOR SKILLS

MOULE III

To operate and servicing, maintenance of Different farm machines

Sub skills

- 1) To operate different seeders and Transplanting equipments
- 2) Operate weeder
- 3) To operate different sprayers
- 4) To repair and servicing of different sprayers
- 5) To operate different harvesting machines
- 6) To operate and maintenance of different threshing machines
- 7) To operate a winnower and also its maintenance

MAJOR SKILLS

MOULE IV

To operate different precision farming and irrigation methods

Sub skills

- 1) Designing and lay out preparation of different irrigation systems
- 2) To repair and maintenance of different types of irrigation pumps
- 3) To design a green house for different vegetables and fruits
- 4) To draw different machine parts

LEARNING OUTCOME OF THE COURSE

After completing the course the learner can perform as

- ❖ Experts in Handling different Measuring tools
- ❖ Engine Mechanic
- ❖ Tractor Mechanic
- ❖ Able to operate Tiller or Tractor
- ❖ Expert in Harvesting Machineries
- ❖ Auto Electrician
- ❖ Technician in various Agriculture implements
- ❖ Accessories sales Executive in Agriculture implements

All the posts mentioned above in job role chart.

COURSE STRUCTURE

This course Consists of Four Module

MODULE NO.	MODULE NAME	NO. OF PERIODS
I	BASIC ENGINEERING AND WORKSHOP TECHNOLOGY	340
II	HEAT ENGINES AND FARM POWER	340
III	FARM MECHANISATION AND POSTHARVEST ENGINEERING.	340
IV	HI-TECH FARMING AND COMPUTER AIDED DESIG	340

Certificates will be issued to the students after the completion of each module respectively as :

1. Work shop technician
2. Farm Mechanic
3. Machine operator (farms)
4. Technician Hi-tech farming.

SYLLABUS

Module 3

(340 Periods)

FARM MECHANISATION AND POST HARVEST ENGINEERING

3.1 AGRICULTURAL IMPLEMENTS

(80 Periods)

Farm Power Source-Statics-Human, Animal, Mechanical, Renewable. Introduction to Tillage-Objectives, Classifications, Types Primary Tillage-Implements-MB plough , Disc plough, Sub soiler , Chisel plough Secondary Tillage-Implements-Cultivator (spring type, Rigid Type)-Harrows-Different types, Renovator ,Bund former, Ridger, Digger , Puddler , Leveler Seeding methods-Broadcasting, Drilling, Dibbling, Transplanting, Seed Dropping, Hill Dropping, Checkrow Planting Seed Drilling –Principle& Operation –Components, Seed cum fertilizer Drill, Seed metering Mechanism-Seed conditioning, Seed dressing ,Seed graders.

Transplanter-Types-Paddy Transplanter , Veg. Transplanter Paddy Transplanter- Principle, Operation , Parts-Types-Walk behind, Riding type Mat nursery preparation Veg. Transplanter-Principle, Operation Seed dibbler, Drum Seeder, Check Row planter Hill Dropper, Pneumatic Seeders (Vacuum type& Air suspension Type) Electronic Seeders(Precision) Weeding-Concepts-types of weeders -Rotary Weeders , ConoWeeder, Power weeder, Brush weeder,Peg, Tooth weeder, Brush cutte Fertilizer Applications-Fertilizer Broadcaster ,Liquid Fertilizer Fertilizer Injector.

3.2 PLANT PROTECTION MACHINERY (60 Periods)

Introduction-Classification-Sprayers , Dusters ,Foggers, fumigators Sprayers- Classifications based on Atomization 3 types 1) Hydraulic/Hydro-pneumatic 2) Air assisted/Air blast 3) Centrifugal. Hydraulic Sprayers- Principle-Parts-Working. Air assisted-- Principle-Parts-Working, Centrifugal sprayers- Principle-Parts-Working. Classification based on mode of operation-Hand sprayer , Air compression sprayer, power sprayer ,Rocker sprayer ,Knapsack sprayer, Traction operated sprayer, Aerial sprayer, Duster, Fogger, Fumigator-Principle &working Repair and Maintenance of Sprayers &Dusters , Safety Precautions.

3.3 HARVESTING MACHINES (70 Periods)

Harvesting-Principle, Objectives Harvesting Equipments-Principle of cutting, Shear Force, impact Force-Sickle-vertical conveyor repair Mower for Fodder Harvesting , Lawn Mower ,Coconut Climber ,Digger, Fruit harvester , Vegetable Harvester ,Reapers Combine Harvester-Types –Cereals/Vegetables &Fruits Combine Harvester (Paddy)-Principle, Parts, working operation, Maintenance, servicing Combine Harvester (Vegetables) Combine Harvester (Fruits).

3.4 POST HARVESTING OPERATIONS (70 Periods)

Threshing- Principle , operation ,Threshing methods (Manual ,Animal ,Mechanical), Mechanical threshers (Axial flow &Cross Flow)-Ground Nut Decorticator , Maze Sheller Parts of a Thresher- Concave , Drum ,Cleaning unit, Type of Threshers-Peg tooth , spike tooth ,Rasp bar ,Angle bar ,loop type& Hammer mill Winnower- Principle , parts ,blower. Drying & Storage-Principle of drying -MC- Sun drying (conduction, convection, Radiation) Mechanical Drying ,Infrared ,Chemical, Grain drying(deep bed ,Thin layer).

3.5 FOOD PROCESSING (60 Periods)

Paddy-parboiling-hullers-polishing-milling, Fruits & Vegetable – Processing Packing & Storage Method-Cold Storage, Refrigeration, Inert gas filling, Controlled atmospheric storage (N₂ Filling, CO₂ Filling) Dry storage method-Bins, Scale, Godowns, Silos

FARM MECHANISATION & POST HARVEST ENGINEERING

(340 PERIODS)

UNIT1 AGRICULTURAL IMPLEMENTS (80 PERIODS)

3.1.1 Farm Power Source-Statics-Human, Animal, Mechanical, Renewable

3.1.2 Introduction to Tillage-Objectives, Classifications, Types

3.1.3 Primary Tillage-Implements-MB plough , Disc plough, Sub soiler , Chisel plough

3.1.4 Secondary Tillage-Implements-Cultivator(spring type, Rigid Type)-Harrows-Different types, Renovator ,Bund former, Ridger, Digger ,Puddler , Leveler

3.1.5 Seeding methods-Broadcasting, Drilling, Dibbling, Transplanting, Seed Dropping, Hill Dropping, Checkrow Planting

3.1.6 Seed Drilling –Principle& Operation –Components, Seed cum fertilizer Drill, Seed metering Mechanism-Seed conditioning, Seed dressing ,Seed graders

3.1.7 Transplanter-Types-Paddy Transplanter , Veg. Transplanter

Paddy Transplanter- Principle, Operation ,Parts-Types-Walk behind, Riding type

Mat nursery preparation

Veg. Transplanter-Principle, Operation

3.1.8 Seed dibbler, Drum Seeder, Check Row planter Hill Dropper, Pneumatic Seeders (Vacuum type& Air suspension Type) Electronic Seeders(Precision)

3.1.9 Weeding-Concepts-types of weeders-Rotary Weeders ,ConoWeeder, Power weeder, Brush weeder,Peg Tooth weeder, Brush cutter

3.1.10 Fertilizer Applications-Fertilizer Broadcaster ,Liquid Fertilizer ,Fertilizer Injector

UNIT 2 PLANT PROTECTION MACHINERY

(80 PERIODS)

3.2.1 Introduction-Classification-Sprayers ,Dusters ,Foggers, fumigators

3.2.2 Sprayers-Classifications based on Atomization 3 types

1) Hydraulic/Hydro-pneumatic

2) Air assisted/Air blast

3) Centrifugal

3.2.3 Hydraulic Sprayers- Principle-Parts-Working

3.2.4 Air assisted-- Principle-Parts-Working, Centrifugal sprayers- Principle-Parts-Working

3.2.5 Classification based on mode of operation-Hand sprayer, Air compression sprayer, power sprayer, Rocker sprayer ,Knapsack sprayer, Traction operated sprayer, Arial sprayer

3.2. 6Safety Precautions while using plant protection machineries

UNIT 3 HARVESTING MACHINES

(70 PERIODS)

3.3.1Harvesting-Principle, Objectives

3.3.2Harvesting Equipments-Principle of cutting, Shear Force, impact Force-Sickle-vertical conveyer repair

3.3.3Mower for Fodder Harvesting , Lawn Mower ,Coconut Climber ,Digger, Fruit harvester , Vegetable Harvester ,Reapers

3.3.4Combine Harvester-Types –Cereals/Vegetables &Fruits

3.3.5Combine Harvester (Paddy)-Principle, Parts, working operation, Maintenance, servicing

3.3.6 Combine Harvester (Vegetables)

3.3.7Combine Harvester (Fruits)

UNIT 4 POST HARVESTING OPERATIONS

(70 PERIODS)

3.4.1Threshing- Principle , operation ,Threshing methods(Manual ,Animal ,Mechanical)

3.4.2 Mechanical Threshers (Axial flow &Cross Flow)-Ground Nut Decorticator , MazeSheller

3.4.3 Parts of a Thresher-Concave, Drum ,Cleaning unit,

Type of Threshers-Peg tooth ,spike tooth ,Rasp bar ,Angle bar ,loop type& Hammer mill

3.4.4Winnower- Principle , parts ,blower

3.4.5Drying & Storage-Principle of drying -MC-Sun drying (conduction, convection, Radiation) Mechanical Drying ,Infrared ,Chemical, Grain drying(deep bed ,Thin layer)

UNIT 5 FOOD PROCESSING

(60 PERIODS)

3.5.1Paddy-parboiling-hullers-polishing-milling

3.5.2 Fruits & Vegetable –Processing

3.5.3 Packing & Storage Method-Cold Storage, Refrigeration, Inert gas filling, Controlled atmospheric storage (N₂ Filling, CO₂ Filling)

3.5.4 Dry storage method-Bins, Scale, Godowns, Silos.

MODULE 4

(340 Periods)

IRRIGATION AND PRECISION FARMING

4.1 IRRIGATION (90 Periods)

Introduction-Different types of irrigation Mechanical irrigation-pump, sprinkler, drip Sprinkler-components-lay out & Design, Installation Drip- components-lay out & Design, Installation Mist-components-applications Fogger -components-applications

4.2 PUMP FOR IRRIGATION (90 Periods)

Pump-introductions & classifications, CF PUMP –working, principles, parts JET pump, reciprocating pump - working, principles, parts, Selection of pumps-WHP Calculation, servicing, repair & Maintenance.

4.3 GREEN HOUSE TECHNOLOGY (90 Periods)

Green House-Concept, Advantages, Disadvantages Types of Green House- Poly House, Glass House, Hardening unit(Temp. & Humidity controller), Rain Shelter, Shade House Green House construction-Frame, covering materials-irrigation system (Fogger, Mist, Drip) Mulch, Fertigation .

4.4 MECHANICAL AUTO-CAD (70 Periods)

Introduction to Auto-Cad, Learn commands, Limit setting, And Drawing of simple Machine parts.

IRRIGATION AND PRECISION FARMING

(340 PERIODS)

UNIT 1 IRRIGATION

(90 PERIODS)

- 4.1.1 Introduction-Different types of irrigation
- 4.1.2 Mechanical irrigation-pump, sprinkler, drip
- 4.1.3 Sprinkler-components-lay out& Design, Installation
- 4.1.4 Drip- components-lay out &Design, Installation
- 4.1.5 Mist-components-applications
- 4.1.6 Fogger -components-applications

UNIT 2 PUMP FOR IRRIGATION

(90 PERIODS)

- 4.2.1 Pump-introductions & classifications
- 4.2.2 CF PUMP –working, principles, parts
- 4.2.3 JET pump, reciprocating pump -working, principles, parts
- 4.2.4 Selection of pumps-WHP Calculation, servicing, repair &Maintenance

UNIT 3 GREEN HOUSE TECHNOLOGY

(90 PERIODS)

- 4.3.1 Green House-Concept, Advantages, Disadvantages
- 4.3.2 Types of Green House-Poly House, Glass House, Hardening unit(Temp. &Humidity controller), Rain Shelter, Shade House
- 4.3.3 Green House construction-Frame, covering materials-irrigation system (Fogger,Mist,Drip)
- 4.3.4 Mulch, Fertigation

UNIT 4 MECHANICAL AUTO-CAD

(70 PERIODS)

- 4.4.1 Introduction to Auto-Cad
- 4.4.2 Learn commands
- 4.4.3 Limit setting
- 4.4.4 Drawing of simple Machine parts

LIST OF PRACTICAL ACTIVITIES

MODULE 3

FARM MECHANISATION & POST HARVEST ENGINEERING

UNIT 1 AGRICULTURAL IMPLEMENTS

1. Field visit to farms of Agriculture department or nearby farms to learn about different tillage operations.
2. Identify and distinguish between primary and secondary tillage through power point presentation.
3. Collect pictures or models of different primary tillage implements and identifying the parts
4. Identifying different secondary tillage implements through field visits, collection of leaflets or catalogues of manufactures
5. Distinguishing between different seeding methods (Field visit, PPP).
6. Make a tiny model of seed dibbler and learn to adjust rate of seed flow.
7. Field visit to learn about mat nursery preparation for mechanical transplanting.
8. Field visit to local farms to learn through doing the operation of paddy transplantation.
9. Make a tiny model of seed drill
10. To learn about electronic seeders through PPP
11. Operate brush cutter
12. Operate Conoweeder.
13. Know the working of power weeders

UNIT 2 PLANT PROTECTION MACHINERY

1. Identify the components of Rocker sprayer by dismantling & assembling it
2. Dismantling & assembling the parts of hand compression sprayer
3. Learn from videos latest precision sprayers
4. Do repairing and maintenance of sprayers
5. Learn the spraying techniques by separating the nozzle, spray lance etc...
6. Learn the parts of dusters

7. Watch the working of fogger & Fumigator through PPP and identify the parts

UNIT 3 HARVESTING MACHINES

1. To learn the principle of cutting, through field visit and distinguish between shear force and impact force
2. To operate lawn movers
3. Field visit to learn operation of combine harvester

UNIT 4 POST HARVESTING OPERATIONS

1. To identify the parts of threshers
2. To distinguish between different types of threshing drums
3. To learn the principles of Winnowing
4. Field visit to learn about mechanical dryers

UNIT 5 FOOD PROCESSING

1. Visit modern rice mill to learn rice processing techniques
2. Visit to vegetables & Fruit processing units
3. Visit to work shop of refrigerators

Dismantle and Assemble the given Vapour compression Refrigeration system and study its working principle, also check for leakage of refrigerant gas

MODULE 4

IRRIGATION AND PRECISION FARMING

UNIT 1 IRRIGATION

1. Design sprinkler system, Practice different Lay-outs & installation
2. Design Drip system Practice different Lay-outs & installation

3. Prepare a seminar report on the topic of mist irrigation and Fogger system

UNIT 2 PUMP FOR IRRIGATION

1. Dismantle and identify the parts of C F pump and assemble it
2. Installation and maintenance of C F pumps
3. Solve the problems related to WHP calculation
4. Determine efficiency of pumps
5. Identify parts of Jet pumps
6. Dismantling and assembling of Reciprocating pump

UNIT 3 GREEN HOUSE TECHNOLOGY

1. To practice Designing structure for green house
2. Selection of covering materials
3. Make tiny model of Green House structure
4. Select humidity control measures for green house

UNIT4 MECHANICAL AUTO-CAD

1. Introduction to Auto-Cad
2. Learn commands
3. Limit setting
4. Drawing of simple Machine parts

LEARNING OUTCOMES

After the completion of third and fourth modules the learner will be achieve the following learning outcomes.

MODULE 3

FARM MECHANISATION & POST HARVEST ENGINEERING

UNIT 3.1 AGRICULTURAL IMPLEMENTS

- 3.1.1 Explain different farm power source
- 3.1.2 Distinguish between different types of Tillage systems
- 3.1.3 Identify different types of primary Tillage implements
- 3.1.4 Explain secondary tillage implements
- 3.1.5 List out different seeding methods
- 3.1.6 Operate seed drills
- 3.1.7 Explain different types of Transplanters
- 3.1.8 Operate seeding equipments
- 3.1.9 Distinguish between different types of weeders
- 3.1.10 Explain different fertilizers applicators

UNIT 3.2 PLANT PROTECTION MACHINERY

- 3.2.1 Explain different types of sprayers and dusters
- 3.2.2 Distinguish the method of atomization in different sprayers
- 3.2.3 Explain the working of sprayers
- 3.2.4 Classify Sprayers based on mode of operation
- 3.2.5 Do repair and servicing of sprayers

3.2.6 Distinguish between Duster, Fogger, Fumigator

3.2.7 Repair & Maintenance of Dusters

3.2.8 Recognize the safety precautions while using plant protection machineries

UNIT 3.3 HARVESTING MACHINES

3.3.1 Explain Principle & objectives of harvesting

3.3.2 Identify different harvesting equipments

3.3.3 Do Explain working different harvesting equipments

3.3.4 Explain the type of combine harvester

3.3.5 Explain the parts & working of combine Harvester (Paddy)

3.3.6 Explain the parts & working of combine Harvester (Vegetables)

3.3.7 Explain the parts & working of combine Harvester (Fruits)

UNIT 3.4 POST HARVESTING OPERATIONS

3.4.1 Explain different threshing method

3.4.2 To operate different threshers

3.4.3 Explain the parts of threshers

3.4.4 To operate a winnower and identify its parts

3.4.5 To explain different drying technique

UNIT 3.5 FOOD PROCESSING

3.5.1 Explain Rice processing techniques

3.5.2 Explain Fruits and Vegetables processing

3.5.3 Recognize the importance of packing and storage methods

3.5.4 Different dry storage method

MODULE 4

IRRIGATION AND PRECISION FARMING

UNIT 4.1 IRRIGATION

- 4.1.1 To distinguish between different types of irrigation
- 4.1.2 Explain the components of mechanical irrigation
- 4.1.3 Explain the working and installation of sprinkler
- 4.1.4 Explain the working and installation of Drip
- 4.1.5 Explain the working and installation of Mist
- 4.1.6 Install fogger system of irrigation

UNIT4. 2 PUMP FOR IRRIGATION

- 4.2.1 Explain the classification of pumps
- 4.2.2 Explain the working principle of C F Pump
- 4.2.3 Explain the working principle of Jet & Reciprocating pumps
- 4.2.4 Select pumps and its WHP calculation
- 4.2.5 To service the given pumps

UNIT4. 3 GREEN HOUSE TECHNOLOGY

- 4.3.1 Explain Green House Technology
- 4.3.2 Identify different types of green houses
- 4.3.3 Construct different type of green houses
- 4.3.4 Explain mulch & fertilization in green house

UNIT4.4 MECHANICAL AUTO-CAD

- 4.4.1 To explain basic Auto-Cad
- 4.4.2 Explain different commands in Auto Cad
- 4.4.3 Able to limit set
- 4.4.4 To draw basic machine components

SCHEME OF WORK

MONTH	NAME OF UNITS	PERIOD
JUNE	AGRICULTURAL IMPLEMENTS	80
JULY	PLANT PROTECTION MACHINERY	60
	HARVESTING MACHINES	20
AUGUST	HARVESTING MACHINES,POST	50
	HARVESTING OPERATIONS	10
SEPTEMBER	POST HARVESTING OPERATIONS	60
OCTOBER	FOOD PROCESSING	60
NOVEMBER	IRRIGATION	80
DECEMBER	IRRIGATION	10
	PUMP FOR IRRIGATION	60
JANUARY	PUMP FOR IRRIGATION	30
	GREEN HOUSE TECHNOLOGY	60
FEBRUARY	GREEN HOUSE TECHNOLOGY	30
	MECHANICAL AUTO-CAD	50
MARCH	MECHANICAL AUTO-CAD	20

STRUCTURE OF MODULES

MODULE 3

FARM MECHANISATION AND POST HARVEST ENGINEERING

UNIT NO	NAME OF UNIT	PERIODS
3.1	AGRICULTURAL IMPLEMENTS	80
3.2	PLANT PROTECTION MACHINERY	60
3.3	HARVESTING MACHINES	70
3.4	POST HARVESTING OPERATIONS	70
3.5	FOOD PROCESSING	60
TOTAL		340

30% Theory and 70% Practical

MODULE 4

IRRIGATION AND PRECISION FARMING

UNIT NO	NAME OF UNIT	PERIODS
4.1	IRRIGATION	90
4.2	PUMP FOR IRRIGATION	90
4.3	GREEN HOUSE TECHNOLOGY	90
4.4	MECHANICAL AUTO-CAD	70
TOTAL		340

30% Theory and 70% Practical

CLASS ROOM ACTIVITY

- Multimedia Presentation
- Seminar
- Group Discussion
- Project
- Power point Presentation
- Chart Preparation
- Assignment
- General Discussion
- Debate
- Quiz

PRACTICAL ACTIVITIES

Demonstration

Maintenance

Repairing

Model Making

Drawing

Identification

Field Visit

O J T

Fault diagnosis and rectification

MODULE 3

FARM MECHANISATION AND POST HARVEST ENGINEERING

OVERVIEW

Agriculture is the principal source of livelihood for more than 55% of the population of India. But, the share of agriculture and allied sectors in gross domestic product (GDP) is only about 15%. Today, India is the world's largest producer of many fresh fruits and vegetables, milk, major spices, select fibrous crops such as jute, staples such as millets and castor oil seed. India is the second largest producer of wheat and rice, the world's major food staples. India has shown a steady average nationwide annual increase in the productivity for some agricultural items, over the last 60 years. These gains have come mainly from the Green Revolution, improving road and power generation infrastructure, knowledge of gains and reforms. Despite these recent accomplishments, agriculture still has the potential for major improvement, because crop yields in India are still just 30% to 60% of the best sustainable crop yields achievable in the farms of developed and other developing countries. Additionally, losses after harvest due to poor infrastructure and unorganised retail cause India to experience some of the highest food losses in the world.

Slow agricultural growth is a serious concern as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and our yields for many agricultural commodities are low. Therefore, it is essential for India to build a productive, competitive, and diversified agricultural sector and facilitate rural, non-farm entrepreneurship and employment. Encouraging policies that promote competition in agricultural marketing will ensure that farmers receive better prices.

As the name indicate this module transacts Farm Mechanisation & Post harvest engineering concepts to the learner. She/he develops the capacity to select and use different agricultural implements and identify its parts. They will be able to detect creative and innovative skills The learner will be able to select plant protection machinery, Harvesting machines, and also able to operate them.

By learning this module they can opt the correct post harvesting operations & the good food processing also its storage

ABOUT THE UNITS

Unit 3.1.1 AGRICULTURAL IMPLEMENTS

Although a very large area of land is available in the world, all of it is not fit for crop production. In order to bring these areas in to an economically fit condition for crop production, a verity of mechanical operations has to be performed. It is interesting to note that the number of mechanical operations performed and crop yield obtained are not related.

Unit 3.1.2 Introduction to tillage

Crop production requires a number of operations like seed bed preparation, seeding, fertilizing, spraying, dusting, irrigation, harvesting and threshing. The first operation in production of crop is **TILLAGE**. It requires higher amount of labour

Unit 3.1.3 Primary Tillage

The main implement for primary tillage is plough used for ploughing Operations, ploughing is the primary tillage operation, which is performed to cut, break and invert the soil partially or completely. Ploughing essentially means opening upper crust of the soil ,breaking the clods and making the soil suitable for sowing seeds. The purpose of ploughing can be summarized as To obtain a deep seed bed for good texture, To increase the water holding capacity of the soil, To increase soil aeration, To destroy weeds and grasses, To destroy insects and pests, To prevent soil erosion, To add fertility to the soil by covering vegetation

Unit3.1.4 SECONDARY TILLAGE IMPLEMENTS

Lighter and finer operations performed on the soil after primary tillage, but before and after seed placement are termed as secondary tillage. These operations are generally done on the surface of soil, very little inversions and shifting of the soil takes place and consequently there is less power requirement per unit area. Secondary tillage implements include harrows, cultivators, sweeps, hillers etc..

Unit 3.1.5 SEEDING METHODS

Seeding or sowing is an art of placing seeds in the soil to have good germination in the field. A perfect seeding gives Correct amount of seed per unit area, Correct depth at which seed is placed in the soil, Correct spacing between row to row and plant to plant

Unit 3.1.6 SEED DRILLING

Seed drill is a machine for placing the seeds in a continuous flow in furrows at uniform rate and at controlled depth with or without the arrangement of covering them with soil. Functions of seed drill. It performed the following functions To carry the seeds, To open furrow to an uniform depth, To meter the seeds, To place the seeds in furrows in an acceptable pattern. To cover the seeds and compact the soil around the seed.

Unit 3.1.7 Transplanter

Transplanting consists of preparing seedlings in nursery and then planting these seedlings in the prepared field. It is commonly done for paddy, vegetable and flowers. It is very time consuming operation. Equipment for placing plants in the soil is called transplanter

Unit 3.1.8 Seeding equipment

The seeding equipment for un irrigated areas are designed to place the seed in farm most soil. The moisture in the surface layer of the seed bed in dry areas is evaporated quickly. Germination of seed may be adversely effected if the seeds are sown at shallow depths of four to five centimeters as in irrigated areas. However, the soil moisture at deeper depths may be sufficient for successful germination of seeds. Deep sowing with a conventional seed drill will result in too deep placement of seed and poor germination. Therefore, the requirements of seed drills for un irrigated areas that is should make a furrow in the soil layer and place the seed in firm moist soil below the bottom of the furrow. The multi row seed drills with packer wheels shown in the accompanying figures are design to obtain the optimum environment for the germination of the seed and growth of the seedling under unirrigated conditions.

Unit 3.1.9 WEEDING

Weeding is the process of eliminating the competition of unwanted plants to the regular crops so that crops can be grown profitably. Management of weeds is an important component of production techniques as elimination of weeds is expensive and hard to achieve. Hymatic Cono Weeders are becoming popular because they are utilized under shallow water conditions. Weeds are uprooted by the teeth of the weeder and buried in the mud by push and pull operations of the weeder

Unit 3.1.10 Fertilizer Injectors

Fertilizer recommendations are generally given in parts per million of nitrogen (ppm N) in the final solution being applied to the crop. Most growers use fertilizer injectors for applying fertilizers to greenhouse crops These devices “inject” a specific amount of concentrated fertilizer solution per increment of irrigation water that passes through the injector. An important attribute of each fertilizer injector is the injector ratio, which is defined as volumetric ratio of stock solution to dilute fertilizer solution.

Unit 3.2 PLANT PROTECTION MACHINERY

Agricultural processing includes those operations which maintain or raise the quality of row material, change its form, or prepare it for the market. Its importance is growing and will continue to increase as farming become more commercialized, specialized and mechanized in India. With the advancement of agricultural science more fields remain covered under crops for longer duration of time due to multiple cropping, intensive farming and better irrigation facilities. Consequently there is increase in plant pests and diseases to a considerable extent. So it has become necessary now to use pesticides and fungicides for controlling the pests and diseases.

The chemicals are applied on plants in the form of spray and dust. Many types of sprayers and dusters are available in different size for plant protection works.

Unit 3.2.1 SPRAYERS

It is a machine to apply fluids in the form of droplets. Sprayer is used following purposes Application of herbicides to remove weeds, Application of fungicides to minimize fungus diseases ,Application of insecticides to control insects pests, Application of micro nutrients on the plants

Unit3.2.2 Classification of Sprayers-BASED on atomization

Many kinds of sprayers and dusting machines are available to met the requirements of agriculturein controlling the insects ,diseases and weeds.Based on atomisation the sprayers are classified as hydraulic knapsack sprayer,air compression system knapsack sprayerand centrifugal sprayers

Unit 3.2.3 Hydraulic Sprayers

Most sprayers used today are hydraulic type in which the spray pressure is built up by the direct action of the pump on the liquid spray material. The pressure thus developed forces the liquid through the injectors or nozzles which break the spray into optimum or proper size droplets and disperse them in the spay pattern as desired, also sufficient energy is imparted to the spray dropletsto carry them from the nozzles to the space to be targeted

Unit3.2.4 Classification based on mode of operation

Classification of sprayers based on mode of operation are hand sprayer,air compression sprayer,power sprayer, rocker sprayer,knapsack sprayer,traction operated sprayer and arial sprayer

Unit 3.2.5 Maintenance and care of sprayer and duster

All knapsack sprayer and other manually operated spraying equipment require little maintenance. However, a little care can considerably lengthen their life as well as enhance their functional efficiency.

Unit 3.2.6 Duster

Duster is a machine to apply chemical in dust form. Duster make use of air streams to carry pesticides in finely divided dry form on the plants

Unit 3.2.7 Recognise the care of power sprayer

A little care can be considerably lengthen the life as well as the functional efficiency of the power sprayer.

Unit 3.3 HARVESTING MACHINES

Harvesting is an important field operation for any food grain crops. The purchase of grain harvesting is to recover grains from the field and separate them from the rest of the crop material in a timely manner with minimum grain loss while maintaining highest grain quality. Recent investigation has shown that delayed at low grain moisture led to considerable increase in field losses and deterioration in the grain quality resulting in reduction in milling outcome. Timely harvest on the other hand, can prevent such a loss

Unit 3.3.1 Principle & objectives of harvesting

Harvesting the field crops constitutes one the most labour consuming operation of farming in india. Though improved primary and secondary tillage implements have been introduced a considerable extend in the country, but the mode of harvesting has not changed much. The harvesting of field crops in india is mostly done by human hands with the help of sickle. It takes about 170 to 200 man hrs to harvest one hector of paddy crop. Due to high labour demand at the time of harvesting, the entire operations continues for weeks together, resulting in over drying of crops in the field which is firm causes grain losses to the extend of 5 to 15%, in subsequent operations. Mechanical devices to harvest weet crop have become popular to some extent in the traditional wheat growing regions of india, but the application of such devices for harvesting paddy and other crops, has yet to be tried on large scale.

Unit 3.3.2 Harvesting Tools and Equipment

Crops are harvested after normal maturity with the objective to take out grain, straw, tubers etc. With out much loss. It involves cutting / digging / picking, laying, gathering, curing, transport and stacking of the crop. In case of cereals like wheat and paddy the plants are straight and smooth and ears containing grains are at the top whereas most of oilseed and pulse crops have branches, which create problems' in harvesting by manual or mechanical

means. As per Bureau of Indian Standards the cutting and conveying losses should not be more than 2 per cent.

Unit 3.3.3 Working of different harvesting equipments

Timeliness of harvest is of prime importance. During harvesting season, often rains and Storms occur causing considerable damage to standing crops. Rapid harvest facilitates extra days for land preparation and earlier planting of the next crop. The use of machines can help to harvest at proper stage of crop maturity and reduce drudgery and operation time. Considering these, improved harvesting tools, equipment, combines are being accepted by the farmers. Different type of mechanical harvesting tools / equipment, suitability for crops and their limitations

Unit 3.3.4 COMBINE HARVESTER

It is a machine, design for harvesting, threshing, separating, cleaning and collecting grains while moving through the standing crops. It consists of header unit threshing system separation unit, and winnowing cleaning system and grain collection unit.

Unit 3.3.5 The parts & working of combine Harvester (Vegetables)

Harvesting of crops like paddy and soybean has to be done carefully as the matured grains easily detach from the ear heads/pods and, therefore, cannot be harvested by fast working tools or machines. Bengal gram, green gram, lentil are to be harvested at ground level. Oilseed crops pose different type of problems to engineers for mechanization of their harvesting.

Unit3.3.6 The parts & working of combine Harvester (Fruits)

Sunflower and Castor: The traditional practice is to manually harvest the flower heads of sunflower and castor plants. These are stacked and sun dried for threshing. Suitable machines are not available for harvesting of sunflower and castor crops. Harvesting of whole plant would require separation of flower heads for threshing and thus the time saved by harvesting the whole plants would not reduce the labour requirement. The combine harvesters are used for harvesting of above crops using specially designed header. These are in use in advanced countries.

Unit 3.4 Post harvesting operations

The process of detaching grains from the earheads of from the plants is known as threshing. Primarily, farmers used to thresh by rubbing heads between two hands. After words they started beating with sickle which is still used for paddy threshing.

Conventionally harvested paddy and wheat crops are either dried in the field or a cemented floor for 3 to 5 days to bring down the moisture content from 27 to 40% to 15 to 20%. When threshing operations are carried out. Threshing of immatured or moist grain would not only in more breakage, but would also require higher impact force for grain detachment and cleaning and grain separation from leftovers would become difficult requiring more power.

Unit 3.4.1 Threshing principle and Different threshing methods

During operation, the crop material is slightly pushed into the threshing cylinder through the feeding chute, which gets into the working slit created between the circumference of the revolving drum having attached spikes and the upper casing. The speed of the spikes is greater than the plant mass due to which they strike the latter which results in part of the grain being separated from straw. Simultaneously, the drum pulls the mass through the gap between the spikes and the upper casing with a varying speed. The angle iron ribs on the other hand, restrain the speed of the travelling of stalks clamped by the spikes. Due to this the spikes move in the working slit with a varying speed in relation to the shifting mass of material, which is simultaneously shifted, with a varying speed with respect to the upper casing. As a result, the material layer is struck several times by the spikes against the ribs, causing threshing of the major amount of grains and breaking stalks into pieces, and also Accelerating them into the inlet of the lower concave.

Unit 3.4.2 Different types of Threshers

There are following types of thresher:Beater type thresher,Corrugated fly-wheel with chopping knife type of thresher,Spike-tooth cylinder type of thresher,Syndicator type ,Hammer mill type,Rasp bar type,Axial flow type

Unit 3.4.3 Different parts threshers

The main components of power thresher are as follows,Concave,Cylinder or drum, Cleaning unit

Unit 3.4.4 Winnower and its parts

Winnowing is the process of separating grain from a mixture of grain and chaff in a air stream created artificially or naturally. Expiration is achieved by allowing the air stream to pass through the mixture falling vertically down. The grain being the heavier material gets deposited almost at the place of dropping, where as the lighter material is blown away to a greater distance. Before the winnowing is started , the threshing floor is thoroughly cleaned and sometimes plastered with cow dung so that soil may not get mixed with the grain.

Winnowing of the crops like paddy in which chaff is a very small fraction is accomplished in one operation only but the second winnowing becomes necessary for crops like wheat , barley etc. When the natural wind velocity is not adequate , artificial means are used to create a sufficiently strong air blast. Winnowing fan either manually operated or mechanically operated

Unit 3.4.5 Drying techniques

Grain drying is the process for conditioning the grains for safe storage. Grain is a living organism and during the drying process its life must be fully safe guarded. Correct drying method preserves the quality , nutritive value and viability of grain.

UNIT 3.5 FOOD PROCESSING

Storage of food products for a long term use is very important in the post harvesting operations. Parboiling, polishing, milling are the important operations that we want to done after winnowing operations. Fruits and vegetables are processed for long term usage. Different methods are using for storing food items, there are cold storage systems, controlled atmospheric storage

Unit 3.5.1 PADDY- Technology of parboiling paddy

Many premilling techniques have been devised to increase the milling, nutritional ,cooking and eating qualities of rice. The latest and most widely used for these treatments is parboiling. The parboiling technology has been evolved from simple methods to complex industrial ones ,and several methods and their advantages and disadvantages are described .

Unit 3.5.3 REFRIGERATION

The process of lowering the temperature of a substance below that of its surroundings atmosphere is called Refrigeration. The heat extracted from the material by the refrigerant is delivered to the atmosphere by air or water .there are various systems of refrigeration but the most common type used for dairy industry is compression refrigeration system. The system is simple, dependable and easily controllable.

Unit 3.5.4 Dry storage method

A variety of storage structures are required on the farm to store animal fodder and feeds, fertilizer, seeds, vegetables, milk and milk products, farm machinery etc. all these products needs different kind of storage conditions, and as a result they have to be stored in special type of storage structure

UNIT GRID

Unit 3.1 Agricultural Implements

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Introduction to Farm Power</p> <p>Source- Statics-Human, Animal, Mechanical, Renewable</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Analysis Skill ➤ Distinguish skill 	<p>Explain different farm power source</p>	<p>Field visit to farms of Agriculture department or nearby farms to learn about different tillage operations.</p>	<p>Practical record Activity log</p>
<p>Introduction to Tillage- Objectives, Classifications, Types</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Analysis Skill ➤ Observation skill ➤ Familiarizing skill 	<p>Distinguish between different types of Tillage systems</p>	<p>Demonstration through multimedia, power point presentation</p>	<p>Prepare chart , Practical record, questionnaire</p>
<p>Primary Tillage Implements</p> <p>MB plough , Disc plough, Sub soiler , Chisel plough</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Identifying Skill ➤ Observation skill ➤ Familiarizing skill 	<p>Identify different types of primary Tillage implements</p>	<p>Collect pictures or models of different primary tillage implements and identifying the parts</p>	<p>Practical record</p>

<p>Secondary Tillage- Implements- Cultivator (spring type, Rigid Type)- Harrows-Different types, Renovator ,Bund former, Ridger, Digger ,Puddler , Leveler, <u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Identifying skill ➤ Classification Skill ➤ Analysis skill 	<p>Explain secondary tillage implements</p>	<p>Identifying different secondary tillage implements through field visits, collection of leaflets or catalogues of manufactures</p>	<p>Prepare chart , Practical record,</p>
<p>Seeding methods- Broadcasting, Drilling, Dibbling, Transplanting, Seed Dropping, Hill Dropping, Checkrow Planting <u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Analyzing skill ➤ Familiarizing skill ➤ Handling skill ➤ Working skill 	<p>List out different seeding methods</p>	<p>Distinguishing between different seeding methods (Field visit, PPP).</p>	<p>Activity log Note Presentation,</p>
<p>Seed Drilling – Principle& Operation – Components, Seed cum fertilizer Drill, Seed metering Mechanism-Seed conditioning, Seed dressing ,Seed graders <u>Skills</u></p>	<p>Operate seed drills</p>	<p>Make a tiny model of seed dibbler and learn to adjust rate of seed flow. Practical demonstration</p>	<p>Activity log Chart , Unit Test ,Quiz</p>

<ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill ➤ Familiarizing skill ➤ working skill 			
<p>Transplanter- Types- Veg. Transplanter Paddy Transplanter- Principle, Operation Parts-</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill ➤ Comparative skill 	<p>Explain different types of Transplanters</p>	<p>Field visit to learn about mat nursery preparation for mechanical transplanting.</p>	<p>Project Evaluation Record, Practical, Viva</p>
<p>Seed dibbler, Drum Seeder, Check Row planter Hill Dropper, Pneumatic Seeders</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Listening, skill ➤ Diagnosing skill 	<p>Operate seeding equipments</p>	<p>Field visit to local farms to learn through doing the operation of paddy transplantation.</p>	<p>Class Test, Viva</p>

<p>Weeding Concepts- types of weeders- Rotary Weeders , Cono Weeder, Power weeder, Brush weeder, Peg Tooth weeder, Brush cutter</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ working skill ➤ Observation skill ➤ Diagnosing skill ➤ Handling skill 	<p>Carryout clutch free pedal play adjustment</p>	<p>Actual demo</p> <p>Demonstration with multimedia</p> <p>Make a tiny model of seed drill</p>	<p>Practical Record Activity log</p>
<p>Fertilizer Applications- Fertilizer Broadcaster Liquid Fertilizer , Fertilizer Injector</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ working skill ➤ Observation skill ➤ Diagnosing skill 	<p>Explain different fertilizers application</p>		<p>Class Test, Viva</p>

Unit 3.2 Plant Protection Machinery

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Introduction-Classification- Sprayers ,</p>	<p>Explain different types of sprayers and dusters</p>	<p>Identify the components of Rocker</p>	<p>Unit test, Quiz</p>

<p>Dusters , Foggers fumigators</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Listening skill ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 		<p>sprayer by dismantling & assembling</p> <p>Demonstration</p>	<p>Classification Chart</p>
<p>Sprayers-Classifications based on Atomization 3 types</p> <ol style="list-style-type: none"> 1) Hydraulic/Hydro-pneumatic 2) Air assisted/Air blast 3) Centrifugal <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Classification skill ➤ Analysis skill ➤ Identifying skill 	<p>Distinguish the method of atomization in different sprayers</p>	<p>Dismantling & assembling the parts of hand compression sprayer</p> <p>Demonstration</p>	<p>Practical Record, Viva</p>
<p>Hydraulic Sprayers- Principle-Parts-Working</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Analysis skill ➤ Handling skill 	<p>Explain the working of sprayers</p>	<p>Group Discussion</p> <p>Multimedia</p> <p>Presentation seminar</p>	<p>Practical Record, Viva Seminar report</p>
<p>Air assisted— Principle-Parts-Working, Centrifugal sprayers- Principle-Parts-Working</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Familiarizing skill ➤ Handling skill 	<p>Explain the Classification of Sprayers based on mode of operation</p>	<p>Do repairing and maintenance of sprayers</p> <p>Demonstration Videos</p>	<p>Discussion points Record, Practical, Viva</p>
<p>Classification based on mode of operation-</p>	<p>Classify different gear boxes</p>	<p>Survey</p>	<p>Survey report</p>

<p>Hand sprayer , Air compression sprayer, power sprayer , Rocker sprayer , Knapsack sprayer, Traction operated sprayer, Aerial sprayer</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill ➤ Comparative skill 	<ul style="list-style-type: none"> • Sliding mesh • Constant mesh • Synchronmesh 	<p>Data collection</p> <p>Demonstration</p>	<p>Data points</p> <p>Activity log</p>
<p>Duster Fogger, Fumigator- Principle & working</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	<p>Repair & Maintenance of Dusters</p>	<p>Demonstration</p> <p>Multimedia presentation</p> <p>Practical activity</p>	<p>Activity log</p> <p>Diagrams</p>
<p>Repair and Maintenance of Sprayers & Dusters</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	<p>Explain the working of synchronmesh gear box</p>	<p>Watch the working of fogger & Fumigator through PPP and identify the parts Demonstration</p>	<p>Practical Record, Viva</p>
<p>Safety Precautions</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill ➤ Handling Skill 	<p>Recognize the safety precautions while using plant protection machineries</p>		<p>Demonstration Note Presentation</p>

Unit3.3 Harvesting Machines

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
Harvesting-Principle, Objectives Skill <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill ➤ Analyzing skill ➤ Familiarizing skill 	Explain Principle & objectives of harvesting	field visit and Demonstration through multimedia	Discussion points Activity log Note Presentation,
Harvesting Equipments- Principle of cutting, Shear Force, impact Force- Sickle- vertical conveyor repair Skill <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill 	Identify different harvesting equipments	To operate lawn movers Demonstration through multimedia Practical activity seminar	Note Presentation, Discussion points Activity log Seminar report
Mower for Fodder Harvesting , Lawn Mower , Coconut Climber , Digger, Fruit harvester , Vegetable Harvester , Reapers Skills <ul style="list-style-type: none"> ➤ Classification Skill ➤ Observation skill 	Explain working different harvesting equipments	Discussion Demonstration through multimedia Field visit	Record, Practical, Viva Assignment

➤ Presentation skill			
Combine Harvester-Types – Cereals/Vegetables &Fruits <u>Skills</u> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill	Explain the type of combine harvester	Discussion Demonstration through multimedia Seminar	Discussion points Practical Record, Viva Seminar report
Combine Harvester (Paddy)-Principle, Parts, working, Maintenance, servicing <u>Skills</u> ➤ Operation skill ➤ Working Skill ➤ Observation skill ➤ Presentation skill	Explain the parts &working of combine Harvester (Paddy)	Discussion Demonstration through multimedia Practical activity Seminar	Discussion points Viva, class test
Combine Harvester (Vegetables) <u>Skills</u> ➤ Operation skill ➤ Working Skill ➤ Observation skill ➤ Presentation skill	Explain the parts &working of combine Harvester(Vegetables)	Discussion Demonstration through multimedia Practical activity Assignment	Discussion points Viva, class test Assignment
Combine Harvester (Fruits) <u>Skill</u> ➤ Operation skill ➤ Working Skill ➤ Observation skill ➤ Presentation skill	Explain the parts &working of combine Harvester (Fruits)	Discussion Demonstration through multimedia Practical activity	Discussion points Activity log Viva, class test

Unit 3.4 Post harvesting operations

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED	ASSESSME
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		ACTIVITIES	NT
<p>Threshing- Principle , operation , Threshing methods (Manual ,Animal ,Mechanical)</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Working skill ➤ Identification skill 	<p>Explain different threshing methods</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>To identify the parts of threshers</p>	<p>Chart,</p> <p>Unit test,</p> <p>Quiz</p>
<p>Mechanical Threshers (Axial flow & Cross Flow)-</p> <p>Ground Nut Decorticator ,</p> <p>Maze Sheller</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	<p>Explain the working of different threshers</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>Practical activity</p> <p>Seminar</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p> <p>Viva,</p> <p>class test</p>
<p>Parts of a Thresher-</p> <p>Concave , Drum ,</p> <p>Cleaning unit,</p> <p>Type of Threshers-</p> <p>Peg tooth ,</p> <p>spike tooth ,</p> <p>Rasp bar ,</p> <p>Angle bar ,</p> <p>loop type& Hammer mill</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Identifying Skill 	<p>Explain the parts and types of threshers</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>Practical activity</p> <p>Seminar</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p> <p>Chart,</p> <p>Unit test,</p>
<p>Winnower-</p> <p>Principle , parts ,</p> <p>blower</p> <p><u>Skills</u></p>	<p>operate a winnower and identify its parts</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p>

<ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill 		Seminar	
<p>Drying & Storage-</p> <p>Principle of drying –</p> <p>Sun drying (conduction, convection, Radiation)</p> <p>Mechanical Drying ,</p> <p>Infrared ,</p> <p>Chemical,</p> <p>Grain drying(deep bed ,Thin layer)</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	Explain different drying techniques	<p>Group discussion</p> <p>Demonstration</p>	<p>Chart,</p> <p>Unit test,</p> <p>Quiz</p> <p>Activity log</p>

UNIT 3.5 FOOD PROCESSING

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Paddy-parboiling-</p> <p>hullers-</p> <p>polishing-</p> <p>milling</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Working skill ➤ Identification skill 	Explain Rice processing techniques	<p>Visit modern rice mill</p> <p>Demonstration through multimedia</p>	<p>Chart,</p> <p>Unit test,</p> <p>Quiz</p>
<p>Fruits &Vegetable –Processing</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	Explain the processing of Fruits and Vegetables	<p>Visit to vegetables & Fruit processing units</p> <p>Demonstration through</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p>

		multimedia Practical activity	Viva, class test
Packing & Storage Method Cold Storage- Refrigeration, Inert gas filling, Controlled atmospheric storage (N2 Filling,CO2 Filling) <u>Skills</u> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Identifying Skill 	Recognize the importance of packing and storage methods	Visit to work shop of refrigerators Demonstration through multimedia Practical activity	Discussion points Activity log Seminar report Chart, Unit test,
Dry storage method- Bins, Scale, Godowns, Silos <u>Skills</u> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill 	Explain Different dry storage method	Discussion Demonstration through multimedia Practical activity	Discussion points Activity log Seminar report

ASSESSMENT ACTIVITIES

Unit 3.1

1. Practical record
2. Activity log
3. Prepare chart
4. Questionnaire
5. Note Presentation,
6. Unit Test
7. Quiz
8. Project Evaluation Record,
9. Practical
10. Viva
11. Class Test

Unit3.2

1. Unit test
2. Quiz
3. Classification Chart
4. Practical Record
5. Viva
6. Seminar report
7. Discussion points
8. Practical
9. Survey report
10. Data points
11. Activity log
12. Diagrams
13. Demonstration
14. Note Presentation

Unit 3.3

1. Discussion points
2. Activity log
3. Note Presentation,
4. Seminar report
5. Record
6. Practical
7. Viva
8. Assignment
9. class test

Unit3.4

1. Chart,
2. Unit test,
3. Quiz
4. Discussion points
5. Activity log
6. Seminar report
7. Viva,
8. Class test
9. Project

Unit3.5

1. Practical record
2. Activity log
3. Prepare chart
4. Questionnaire

5. Note Presentation,
6. Unit Test
7. Quiz
8. Project Evaluation Record,
9. Practical
10. Viva
11. Class Test

List of items in portfolio

Unit3.1

Note Presentation, Prepare chart , Practical record, Seminar, Field visit on Agricultural implement of Primary tillage, Secondary tillage, Working of Transplanter, Models of Seed Drills, Operate Brush cutter, Working of Power Weeder

Unit3.2

Practical log on maintenance of Sprayer

Chart preparation and seminar on different type of sprayers

Class note, Field visit diary of working in Duster, Fogger, fumigator

Unit3.3

Activity log , field visit diary on operation of combine harvester

Chart Preparation and seminar on identify different harvesting equipment

Multimedia presentation on parts and working of combine harvester

Unit3.4

Chart preparation and seminar on different type of drying techniques

Activity log, on operate a winnower and its parts

Class note on different storage methods

Activity log, Field visit diary on different type of Threshers

Unit3.5

Chart preparation and seminar on different dry storage method

Activity log and Field visit diary on different Rice processing techniques

EXTENDED ACTIVITIES

1. Conduct campaigning of safe use of pesticides by establishing classes
2. Conduct demonstration classes to villagers on Sprayers and Dusters
3. Conduct an awareness programme to Kudumbasree units about Agricultural Machinaries
4. Start up group on Agricultural enterprises

MODULE 4

IRRIGATION AND PRECISION FARMING

Over view

As the indicate this module transacts Irrigation and Precision Farming concepts to the learner. She/he develops the capacity to select and use different agricultural Irrigation systems and identify its parts. They will be able to detect creative and innovative skills The learner will be able to select Pumps for irrigation, and also able to operate them. By learning this module they can opt the correct green house according to the atmospheric conditions, By learning Auto CAD ,they can design and draw basic machine elements

ABOUT THE UNITS

UNIT 4.1 IRRIGATION

Irrigation is the artificial application of water to the soil using proper method to fulfill the water requirement of crop for its optimum growth and production. Irrigation water is applied to supplement the water available from rainfall and soil moisture. The success of irrigation depends on selection of the method as per the conditions and planning, projecting, establishing and operating the irrigation system.

4.1.1 Classification of Irrigation systems

Several methods of irrigation techniques are used nowadays depending on water availability, the type of crop and the financial status of the farmers. Various types of irrigation techniques differ in how the water obtained from the source is distributed with in the field

4.1.2 Mechanical irrigation-pump, sprinkler, drip

Modern intensive agriculture requires sufficient supply of water for proper irrigation at right time. The water lifting devices operated by human or animal can't meet this

demand. On the other hand ,other power sources such as hydro power, wind power or solar power are available in all the areas and at all the time. Therefore, mechanically powered devices are most commonly used for lifting of water for irrigation and are popularly referred as **pumps**.

4.1.3 Sprinkler-components-lay out& Design, Installation

In sprinkler irrigation method, water is delivered through pressurized pipe network to nozzles or jets which spray the water into the air to fall on the soil. The fall of water is like an artificial rain

4.1.4 Drip- components-lay out &Design, Installation

Drip irrigation is the slow application of low pressure water to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing and emitters. Drip irrigation is sometimes called trickle irrigation and involves dripping water on to the soil at very low rates 2-20 liters/hour from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only part of the soil in which the roots grow is wetted, unlike surface and sprinkler irrigation, which involve wetting the whole soil profile. With drip irrigation water applications are more frequent than with other methods and this provides a very favorable moisture level in the soil in which plants can flourish.

UNIT 2 PUMP FOR IRRIGATION

Pumps are very important in the irrigation systems. Pumps can deliver water from a lower position to required higher level in specific quantity. They are mainly classified in to two groups Positive displacement pumps and rot dynamic pumps. The learner can explain the working principle of centrifugal pump, they can rectify the complaints of the Centrifugal pumps, Reciprocating pumps & Jet pumps, He / She can also calculate WHP ,they can service the pumps

4.2.1 Pumps

Modern intensive agriculture requires sufficient supply of water for proper irrigation at right time. The water lifting devices operated by human or animal can't meet this demand. On the other hand ,other power sources such as hydro power, wind power or solar power are available in all the areas and at all the time. Therefore, mechanically powered devices are most commonly used for lifting of water for irrigation and are popularly referred as **pumps**. However, the sources of power for operating the pumps may be electric motors, internal combustion engines, wind power, hydro power or solar energy. A pump is a device or

machine which when fitted with a conduit, transfers the energy from the external source to the liquid flowing through the conduit.

4.2.2 CF PUMP –working, principles, parts

A centrifugal pump may be defined as a device in which an impeller rotating inside a close fitting case draws in the liquid at centre and by virtue of centrifugal force throws out the liquid through an opening at the side of the casing. Centrifugal pumps are most widely used in irrigation practice. They are simple in construction, easy to operate, have low initial cost and produce a constant steady discharge

4.2.3 JET pump, Reciprocating pump -working, principles, parts

It is a pump which consists of a centrifugal pump and a jet mechanism (or ejector). The centrifugal pump operates at the ground surface and jet is placed in the well below the water surface. The centrifugal pump provides the driving head and capacity for the jet to be operated in the well.

4.2.4 Selection of pumps-WHP Calculation, servicing, repair & Maintenance

Selection of a suitable water lifting device depends on type of water, the amount of water to be lifted, the depth of pumping water level, type and amount of power available and the economic status of the farmer. Every pump installation has different operating head and discharge conditions. Therefore, it is necessary to select the pump such that it operates under maximum efficiency with the given head and the discharge. This is done by plotting characteristic curves, both for the well and the pump. The characteristic curves are the curves relating the important parameters like head, discharge, efficiency and power requirements

UNIT 3 GREEN HOUSE TECHNOLOGY

Over view

Green House Technology is developed for growing plants in a plants friendly atmosphere, that is a controlled temperature, Humidity and other atmospheric properties. The learner can explain the advantages & disadvantages of green house technology. The lesson also explains different types of green houses, that is according the materials using for the construction of green house. He /She can design a green house with its irrigation system. Mulch and fertigation are the very important trends in agriculture for a weed free cultivation

4.3.1 Green House-Concept, Advantages, Disadvantages

The term green house refers to structure covered with a transparent material for the purpose of admitting natural light for plant growth. The structure is usually heated ,artificially and differs from other growing structures such as cold frames and hot beds in that it is sufficiently high to permit a person to work from within. Green house is a frame or an inflated structure covered with a transparent material in which crops could be grown under the condition of at least partially controlled environment and which is large enough to permit person to work with in it to carry out cultural operation.

4.3.2 Types of Green House-Poly House, Glass House

Green house can be classified based on their shape and style, uniqueness of cros section of the green house etc

4.3.3 Green House construction-Frame, covering materials-irrigation system (Fogger, Mist, Drip)

Green House Construction

Greenhouse construction has been involved in various fields. Besides agronomy, forestry science and technology and horticulture in the traditional sense, the architecture, aesthetics, mechanics, steel structure, ergonomics, computer automatic control, air conditioning and new materials etc. are increasingly involved as well. Technology has been adhering to such principle and introducing talents in various fields to make greenhouse widely applied to each field without being exclusive to agriculture and forestry

4.3.4 Mulch, Fertigation

We farmers have to work hard for food to eat and clothes to wear. But when we can produce enough from this work, then we can live well. For farmers, the foundation of our wealth is the soil. If soil is washed away or becomes poor, how can we grow food to eat ? We farmers, who work and play with the soil, must also learn to love the soil. One method of loving, caring for and respecting the soil is called mulching. Mulching is a method of using cut leaves, straw, leaf litter etc. to cover the bare soil while still farming and growing crops on it.

UNIT4 MECHANICAL AUTO-CAD

The method of preparing drawing by using computer software is knowing AutoCAD. AutoCAD is a computer-aided design (CAD) or Computer Aided design and Drafting. This program used for 2-D and 3-D design and drafting. AutoCAD is developed and marketed by Autodesk.

4.4.1 Introduction to Auto-Cad

The method of preparing drawing by using computer software is knowing AutoCAD. AutoCAD is a computer-aided design (CAD) or Computer Aided design and Drafting. This program used for 2-D and 3-D design and drafting. AutoCAD is developed and marketed by Autodesk.

4.4.2 Learn Commands

Command Line is just below the layout line. Where command is typed in this area typed the data as asked for and then press Enter Key .Command are used to an activity

4.4.3 LIMIT SETTING

The drawing "limits" as defined by AutoCAD is a rectangular area in which you are allowed to draw. This is the area which will be displayed when you "zoom" "all." It is also the area in which the visible grid and snap grid are extended .

4.4.4 Drawing of simple Machine parts

Detailed Drawings

UNIT GRID

UNIT 4.1 IRRIGATION

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Introduction</p> <p>Different types of irrigation</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Identifying Skills 	<p>Explain and distinguish between different types of irrigation</p>	<p>Group discussion</p> <p>Demonstration</p> <p>Design sprinkler system,</p> <p>Practice different Lay-outs & installation</p>	<p>Record, Practical,</p> <p>Viva</p> <p>Activity log</p>
<p>Mechanical irrigation-pump, sprinkler, drip</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classification Skill 	<p>Explain mechanical irrigation and its components</p>	<p>Discussion</p> <p>Demonstration using multimedia</p> <p>Classification chart</p>	<p>Unit test,</p> <p>Quiz</p> <p>Activity log</p> <p>Chart</p> <p>Project report</p>
<p>Sprinkler-components- lay out & Design, Installation</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Working Skill ➤ Observation skill ➤ Presentation skill 	<p>Explain the working and installation of sprinkler</p>	<p>Design Sprinkler system</p> <p>Practice different Lay-outs & installation</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p>

<p>Drip- components- lay out & Design, Installation</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Working Skill 	<p>Explain the working and installation of Drip</p>	<p>Design Drip system</p> <p>Practice different Lay-outs & installation</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p>
<p>Mist- components- applications</p> <p><u>Skills</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Working Skill 	<p>Explain the working and installation of Mist</p>	<p>Design Mist system</p> <p>Practice different Lay-outs & installation</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Discussion points</p> <p>Activity log</p> <p>Seminar report</p>
<p>Fogger – components- Applications</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Working Skill 	<p>Install fogger system of irrigation</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Discussion points</p> <p>Record</p> <p>Practical,</p> <p>Viva</p>

UNIT 2 PUMP FOR IRRIGATION

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Pump- introductions & classifications</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Classifications Skill 	<p>Explain the Working and classification of pumps</p>	<p>Dismantling and assembling of Pumps</p> <p>Demonstration through multimedia</p>	<p>Record, Practical</p> <p>Viva</p> <p>Activity log</p>
<p>CF PUMP – Reciprocating pump working, principles, parts</p> <p><u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Handling Skill ➤ Working skill 	<p>Explain the working of C F Pump and Reciprocating Pump</p>	<p>Dismantling and assembling of C F Pumps</p> <p>Diagram</p>	<p>Record, Practical</p> <p>Viva</p> <p>Activity log</p>
<p>JET pump, reciprocating pump - working, principles, parts</p> <p><u>Skill</u></p>	<p>Explain the working of Jet & Reciprocating pumps</p>	<p>Dismantling and assembling of Jet & Reciprocating pump</p> <p>Demonstration through multimedia</p> <p>Practical activity</p>	<p>Record, Practical</p> <p>Viva</p> <p>Activity log</p>

<ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Handling Skill ➤ Working skill 		Seminar	
<p>Selection of pumps- WHP Calculation, servicing, repair &Maintenance <u>Skill</u></p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Working Skill ➤ Handling Skill 	Select pumps and its WHP calculation	Demonstration through multimedia Practical activity	Record, Practical Viva

UNIT 3 GREEN HOUSE TECHNOLOGY

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Green House-Concept, Advantages, Disadvantages</p> <p>Skills</p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Construction skill 	Explain Green House Technology	<p>To practice Designing structure for green house</p> <p>Demonstration through multimedia</p>	<p>Viva</p> <p>Class test,</p> <p>Quiz</p> <p>Activity log</p>
<p>Types of Green House-Poly House, Glass House, Hardening unit(Temp. &Humidity controller), Rain Shelter, Shade House</p> <p>Skills</p>	Explain different types of green houses	<p>Selection of covering materials</p> <p>Demonstration through multimedia</p>	<p>Note</p> <p>Presentation</p> <p>Seminar</p>

<ul style="list-style-type: none"> ➤ Classification skill ➤ Observation skill ➤ Presentation skill 			
<p>Green House construction- Frame, covering materials-irrigation system (Fogger, Mist, Drip)</p> <p>Skill</p> <ul style="list-style-type: none"> ➤ Assemblings skill ➤ Observation skill ➤ Handling skill 	<p>Explain and Construction of different type of green houses</p>	<p>Make tiny model of Green House structure</p> <p>Demonstration through multimedia</p> <p>Seminar</p>	<p>Chart, Unit test, Quiz Seminar report</p>
<p>Mulch, Fertigation</p> <p>Skills</p> <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill 	<p>Explain mulch & fertilization in green house</p>	<p>Select humidity control measures for green house</p> <p>Demonstration using multimedia</p>	<p>Viva, class test, Quiz Project report</p>

UNIT4 MECHANICAL AUTO-CAD

IDEAS/CONCEPTS/SKILLS	LEARNING OUTCOMES	SUGGESTED ACTIVITIES	ASSESSMENT
<p>Introduction to Auto-Cad</p> <p>Skills</p> <ul style="list-style-type: none"> ➤ Drawing skill ➤ Observation skill ➤ Presentation skill 	<p>Draw and explain basic Auto-Cad</p>	<p>Discussion</p> <p>Demonstration through multimedia</p> <p>Diagram</p>	<p>Drawing, Viva</p>
<p>Learn commands</p>	<p>Explain different commands in</p>	<p>Discussion</p>	

Skills <ul style="list-style-type: none"> ➤ Drawing skill ➤ Observation skill ➤ Presentation skill 	Auto Cad	Demonstration using multimedia	Drawing, Viva
Limit setting Skills <ul style="list-style-type: none"> ➤ Observation skill ➤ Presentation skill ➤ Drawing skill 	Able to limit set	Group discussion Demonstration	Drawing, Viva
Drawing of simple Machine parts Skills <ul style="list-style-type: none"> ➤ Drawing skill ➤ Observation skill ➤ Presentation skill 	To draw basic machine components	Group discussion Drawing of simple Machine par Demonstration	Drawing, Viva

ASSESSMENT ACTIVITIES

Unit4.1

1. Record,
2. Practicl,
3. Viva
4. Activity log
5. Unit test,
6. Quiz
7. Chart
8. Project report
9. Discussion points
10. Seminar report

Unit4.2

1. Record,
2. Practical
3. Viva
4. Activity log

Unit4.3

- 1.Viva
- 2.Class test,
- 3.Quiz
- 4.Activity log
- 5.Note Presentation
- 6.Seminar
- 7.Chart,
- 8.Unit test,

Unit4.4

1. Drawing,
2. Viva

List of item in Portfolio

Unit4.1

Project report on micro irrigation system
Activity log, Class note on Mechanical irrigation and its component
Chart preparation and Seminar report on Mist, Fogger
Activity log on Sprinkler, Drip irrigation systems

Unit4.2

Activity log, Class note on working of different types of pump
Chart preparation and seminar on Jet and reciprocating pumps
Activity log on selection of pumps

Unit4.3

Chart preparation and seminar on different type of Green houses

Activity log and class note on Construction of green house

Field visit diary and class note on Mulch

Multimedia presentation on irrigation and fertilization in green house

Unit4.4

Draw on basic Auto-CAD

Class note on different comment in Auto-CAD

Draw on basic Machine components

EXTENDED ACTIVITIES

1. Set up an agri Machinery clinic at school
2. Conduct a campaign for pest/disease control in the panchayath. Prepare leaflets on pest and disease control and distribute to the local farmers to create awareness.

ON THE JOB TRAINING

Linkage with industry is the important factor to achieve the goals in vocation education . this can be achieved only through OJT provided is conducted strict accordance to the regulation

The students will be exposed to the organization agricultural and industrial atmosphere of OJT centres.OJT period will help them to develop social skills and motive work.OJT helps to improve leadership quality, punctuality and responsibility. The technical experience gained during OJT will nourish creative and innovative skills

OJT may be conducted in two spells of 15 days each at the end of module iii and module iv

OJT refers to that component of vocational curricula which takes place in a real job situation under the supervision of an expert or in- plant supervisor. It provides participation in the actual production of goods and services. It prepares the student psychologically in developing entrepreneurship qualities. It helps in continuous evaluation of the student's work and knowledge.The student is exposed to the latest technology and equipments. The student finds the real feelings in taking instructions from the supervisor.It provides the student overall exposure and the use of material and machinery. It leads to increased production of goods and services to the employers at less cost.

Time : End of each module

Duration : 15 days per year

List of possible OJT Centres

GENERAL

Various institutions under Kerala Agricultural University
(Colleges, research stations)

Krishi Vigyan Kendras (KVKs)

Krishi Bhavans

Central Government Institutions like CTCRI, CPCRI, IISR etc.

VFPCK centres

State Horticulture Mission

Various Commodity Boards, Government of Kerala

District Seed Farms

Extension Training Centres

Various NGOs like Thanal, PASSS, Mithra Niketan, MSSRF

Regional Agricultural Training and Testing Centres
Agro service centres
Safal markets
HORTICROP

REFERENCES

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Jagadheeswar Sahai
- 2) FUNDAMENTALS OF AGRICULTURAL ENGINEERING
Er. Sanjay Kumar, Er. Vishal Kumar, Dr. Ram Kumar Sahu
- 3) Agricultural Engineering
A M Michael & T P Ojha)
- 4) Machine Drawings and Mechanical Auto CAD
P I Varghese