

## Upgradation of ITIs into Centres of Excellence-Broad guidelines for implementation of Syllabi of

### Sector Agricultural Machinery

These Centres will be providing multiskill training to meet the skill requirement of particular sector of industry with their active involvement in all aspects of training. The training will be provided in three parts as given below:

- ✓ Training in Basic skill areas for a period of one year.
- ✓ Training in Advanced modules for next six months.

The testing & certification for the Basic skill training during first year & also for advanced training during next six months will be done under NCVT

- ✓ Training in specialized modules mainly in the industry (The course curricula, duration etc will be designed in consultations with the IMC/local industry. The trade testing & certification for this component will be done jointly by the State Government & Industry. Said certificate will be recognized by NCVT

As per the recommendations of the EFC, Training in the shop floor should constitute atleast 25-40% of the curriculum.

The training programme will have multi-entry and multi-exit provisions:

- ✓ trainee can opt to go to the labour market after completing broad based basic training of one year duration as well as after completing 1½ year of training.
- ✓ trainee can join advanced module as per his/her after some time .Specialized module would be offered after completing BBT & at least one advanced module .
- ✓ ITI pass out trainee of the particular trade(s) from the conventional system can seek admission for advanced/specialized training in the relevant sector .

As per the approved curricula in the Area/Sector of Chemical , uniform rotation of trainees in six modules each of eight weeks duration as mentioned below is envisaged to be taken up. The trades from where existing infrastructure

*i.e. equipment/ instructor etc. could be utilized for the training in 'Sector Agricultural Machinery' and space requirement of each module is as under:*

<b>Basic Module</b>	<b>NAME OF THE MODULE</b>	<b>Trade(s) from where existing infrastructure/equipment/instructor could be utilised</b>
<b>AMBT-01</b>	<b>Basic Workshop Skill</b>	Fitter/Machinist
<b>AMBT-02</b>	<b>Electrical Wiring and Electronics</b>	Mechanic Tractor/Mechanic Motor Vehicle
<b>AMBT-03</b>	<b>Tractor and Power Tillers</b>	Mechanic Tractor/Mechanic Motor Vehicle
<b>AMBT-04</b>	<b>Irrigation Machinery</b>	Mechanic Agricultural Machinery -
<b>AMBT-05</b>	<b>Crop production Machinery</b>	Mechanic Agricultural Machinery
<b>AMBT-06</b>	<b>Post Harvest Technology</b>	Mechanic Agricultural Machinery

**For each of above module, Trade Practical will be 28 hours /week and Trade theory for 4 hours /week. Apart from above, Generic modules as mentioned below will be taught throughout the year.**

*Module G-01 BASIC COMPUTER APPLICATION ..... ( 4 hrs per Week)*

**Module G-2 -ENTREPRENEURSHIP AND COMMUNICATION SKILLS... .....2 hrs/week**

In addition, 4 hours/week have been kept for Library studies & Physical Training

**Vocational Instructors:**

<b>NAME OF THE MODULE</b>	<b>No. of Vocational Instructors (VIs)</b>

<b>FPBT – 01 to 06</b>	Six VIs one each for 6 module of relevant trades
<b>G-01</b>	One VI with relevant qualification as per need of module .
<b>G-02</b>	One contract/part time / guest faculty for Generic module, ENTERPRENEURSHIP AND COMMUNICATION SKILLS –G-01

The eligibility and other criteria for admission will be as under :

**Eligibility :** 10<sup>th</sup> pass under 10+2 system .

**Batch size :** 96 trainees 16 in each module ( 20% supernumeraries be allowed to take care of drop outs as already exist under CTS)

**Admission:**

**Fee Structure:**

Fee Structure may be decided by States Govt. in consultation with IMCs . It may be desirable to prescribe a uniform tuition fee for a sector in all Centres of Excellence of a state .

**Space:**

Since workshop/theory class rooms are envisaged to be accommodated in the existing building of the ITI, therefore, following norms are prescribed only for new infrastructure is to be created .

- (1) Workshop space : 80 Sqm. For each modules.
- (2) Three Theory classrooms of 30 Sqm each .

*The Theory classrooms should have latest infrastructure including AV aids as per details given below:*

- |  |              |
|--|--------------|
| 1. Suitable Chairs/ tables*                      | -As required |
| 2. OHP/Epidiastope                               | - 1 No.      |
| 3. Laptop computer/PC (latest) & LCD projector** | -1 No.       |

- |                         |               |
|-------------------------|---------------|
| 4. Magnetic white board | -1 No.        |
| 5. White board          | -1 No.        |
| 6. Flip chart           | -1 No.        |
| 7. Storage Almirah      | - As required |

(\* Optimum utilization of space/flexibility may be kept in view)

(\*\*Keeping in view the constraints of funds under the scheme, it is proposed to procure only one set of Laptop computer/PC / LCD projector for CoE. However, States if so desire may procure additional Laptop computer/PC/LCD projector from their funds) While selecting furniture, it should be kept in mind that these are meant for Centres of Excellence. Criteria like maximum flexibility/utilization of space should be kept in view.

**Office Equipment:**

For each CoE one Scanner, one Photocopy Machine and one PC/printer along with suitable accessories/furniture and internet connection (if not already available in the institute) is proposed to be provided for each CoE, in addition to the equipment prescribed in the syllabus.

**Addition/alteration/Construction:**

For Civil Works, tentative amount of Rs 40.00 lakhs have been proposed per CoE. It is envisaged to have separate block/ wing for the Centres of Excellence in the ITI campus. In case space is available in the existing building of an ITI for taking up new areas as per requirement of the cluster of Industry, the existing space will be renovated as per the need. Alternately, separate block will be built up in the same campus keeping in view the space requirements of the Electrical Sector .

While planning for addition /alteration/Construction of workshop and Class rooms, following may be kept in view:

- ✓ concept of a Centre of Excellence
- ✓ the fact that the requirement of funds for construction /addition /alteration for advanced training will be higher than that of basic training

**Publicity**

Wide publicity & advertisement be given for better response . The role of the local as well as the concerned Industry is very vital for the success of this program.

States may consider providing additional equipment/ other facilities like separate Library/upgradation of existing Library, Conference Hall/ Committee Room etc. from their own funds.

## INDEX

### UPGRADATION OF ITIS INTO CENTRE OF EXCELLENCE

### SECTOR / AREA : Agricultural Machines

### BROAD BASED BASIC TRAINING ( ONE YEAR )

<b>Basic Module</b>	<b>NAME OF THE MODULE</b>	<b>Trade(s) from where existing infrastructure/equipment/instructor could be utilised</b>
<b>AMBT-01</b>	<b>Basic Workshop Skill</b>	Fitter/Machinist
<b>AMBT-02</b>	<b>Electrical Wiring and Electronics</b>	Mechanic Tractor/Mechanic Motor Vehicle
<b>AMBT-03</b>	<b>Tractor and Power Tillers</b>	Mechanic Tractor/Mechanic Motor Vehicle
<b>AMBT-04</b>	<b>Irrigation Machinery</b>	Mechanic Agricultural Machinery -
<b>AMBT-05</b>	<b>Crop production Machinery</b>	Mechanic Agricultural Machinery
<b>AMBT-06</b>	<b>Post Harvest Technology</b>	Mechanic Agricultural Machinery

# Module I

## Basic Workshop Skills

### AIM

To develop high level competence in different workshop operations required for handling, repair and maintenance of Agricultural Machines

**DURATION 8 WEEKS**

## Module I – Basic Workshop Skills

	Theory	Practicals
<b>Measurement</b>	<ul style="list-style-type: none"><li>• Terms used in measurement</li><li>• Different types of errors</li><li>• Instruments used for linear and angular measurement</li><li>• Care and maintenance of instruments</li><li>• Micrometers</li><li>• Simple calculations</li><li>• Units, Conversions from one unit to another</li><li>• Use of calculator</li></ul>	<ul style="list-style-type: none"><li>• Measurement of length, slope, angles, thickness, diameter</li><li>• Use of micrometers and calipers for precise measurement</li><li>• Calculation of area, volume, perimeter, slope, Areas of simple regular and irregular figures.</li></ul>
<b>Drawing</b>	<ul style="list-style-type: none"><li>• Principles of freehand sketching</li><li>• Different views</li><li>• Symbols and notations used in drawing</li><li>• Reading and understanding drawings</li></ul>	<ul style="list-style-type: none"><li>• Practice in freehand sketching</li><li>• Draw views of simple objects</li><li>• Interpreting given drawings</li></ul>
<b>Hand tools</b>	<ul style="list-style-type: none"><li>• Types of hand tools used in Agriculture</li><li>• Identification of different hand tools</li><li>• Names of parts</li><li>• Specifications</li><li>• Selection and use, proper applications</li><li>• Safety in use of hand tools</li></ul>	<ul style="list-style-type: none"><li>• Freehand sketching</li><li>• Exercises on use of hand tools with proper techniques and safety</li></ul>

	<b>Theory</b>	<b>Practicals</b>
<b>Cutting &amp; Filing</b>	<ul style="list-style-type: none"> <li>• Identification of common tools used for cutting</li> <li>• Different materials used e.g. MS Pipe, sheets, Asbestos, Brass, PVC and Wood etc.</li> <li>• Holding devices : Vices, Workbenches</li> <li>• Filing &amp; cutting – Procedures and techniques</li> <li>• Criteria for selection of tools for a task</li> <li>• Methods of sharpening and maintenance</li> <li>• Tools for marking, methods of marking</li> <li>• Different types of files, Specifications, Selection of files</li> <li>• Precautions in filing</li> <li>• Safety precautions in cutting and filing</li> </ul>	<ul style="list-style-type: none"> <li>• Mark using punches</li> <li>• Cut the materials using appropriate cutting tool</li> <li>• File surfaces to given accuracy</li> <li>• Sharpen chisels, blades, knife</li> </ul>
<b>Drilling</b>	<ul style="list-style-type: none"> <li>• Use of electrical drill machines</li> <li>• Types of drill bits</li> <li>• Selection and replacement of drill bits</li> <li>• Methods of drilling</li> <li>• Safety precautions</li> </ul>	<ul style="list-style-type: none"> <li>• Marking and punching</li> <li>• Drill holes of given dimensions on given materials with electric drill and hand drill</li> <li>• Cleaning and finishing</li> </ul>
<b>Wood work</b>	<ul style="list-style-type: none"> <li>• Common carpentry tools, their adjustments and use</li> <li>• Selection of tools</li> <li>• Methods of sharpening, maintenance</li> <li>• Safety considerations</li> </ul>	<p>Proficiency in wood working operations using appropriate tools, safely</p> <ul style="list-style-type: none"> <li>• Cutting</li> <li>• Planing</li> <li>• Grooving</li> <li>• Making joints</li> <li>• Assemblies</li> </ul>

	Theory	Practicals	<b>Module I</b>
<b>Welding</b>	<ul style="list-style-type: none"> <li>• Common terms used in welding</li> <li>• Types of welding</li> <li>• Advantages and limitations of Arc and Gas welding</li> <li>• Setting up procedures of welding equipment.</li> <li>• Types of welding joints</li> <li>• Welding procedures to be followed during flat, horizontal, vertical and overhead positions</li> <li>• Left hand right hand techniques</li> <li>• Pre-weld and post weld operations</li> <li>• Types of defects, defect removal</li> <li>• Methods of testing a weld</li> <li>• Safety gear, precautions to be observed in welding</li> </ul>	<ul style="list-style-type: none"> <li>• Repairs</li> <li>• Set up arc &amp; gas welding equipment and test for safety</li> <li>• Perform pre-weld operations</li> <li>• Prepare butt, lap, corners, edge and tee joints using different positions and different types of welds</li> <li>• Check welding joints for defects and rectify them</li> <li>• Test for quality &amp; strength</li> </ul>	
<b>Sheet metal work</b>	<ul style="list-style-type: none"> <li>• Tools used</li> <li>• Types of snips, punches, bending and folding tools</li> <li>• Different types of stakes, mallets</li> <li>• Selection of materials</li> <li>• Drawing of development of object to be fabricated</li> </ul>	<ul style="list-style-type: none"> <li>• Reading / Making of drawing of a object</li> <li>• Surface preparation and marking.</li> <li>• Cutting and bending exercises</li> <li>• Jointing, riveting, final finishing</li> <li>• Development of objects</li> </ul>	

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Wing Divider 200 mm	16
2.	Ordinary Wooden Mallet 50 mm	16
3.	Cross peen Hammer 0.25 KG	16
4.	Steel Tape 2 Mtr.	16
5.	Rule steel 15 cm with metric graduations	16
6.	Square try 10 cm blade	16
7.	Caliper outside 15 cm spring	16
8.	Caliper inside 15 cm spring	16
9.	Caliper 15 cm hermachrodite	16
10.	Divider 15 cm spring	16
11.	Scriber 15 cm	16
12.	Punch centre 10 cm	16
13.	Screw Driver 15 cm	16
14.	Chisel cold 20 cm	16
15.	Hammer ball peen 0.45 kg. With handle	16

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
16.	Hammer ball peen 0.22 kg with handle	16
17.	File flat 25 cm. Second cut, file triangular	16
18.	File flat 25 cm. Smooth cut	16
19.	File half round second cut 15 cm. Square 30 cm	16
20.	Hacksaw Frame adjustable 20-30 cm	16
21.	Safety goggles	16
22.	Dot slot punch	16
23.	Gloves pair leather	16
24.	Screen Welding hand	16
25.	Goggles pair welder	16
26.	Wire Brush 15 cm x 3.7 cm	16
27.	Spark lighter	16
28.	Chipping screen hand	16
29.	Tongs Holding 30 cm.	16
30.	Claw Hammer	16

### Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Drawing instruments box	04
2.	Micrometer 0-25, 25-50, up to 150 cm inside	04
3.	Vernier calipers 250 mm	04
4.	Set of plier, combination plier 6" to 12", Side cutting plier 15 cm, Gas plier 8", Nose plier round 15 cm, Nose plier flat 15 cm, Monkey plier 8", 12"	04 each
5.	Sledge Hammer 15 cbs, 12 cbs	02 each
6.	Cross peen hammer 0.45 kg, 0.75 kg	04 each
7.	Ball peen hammer 0.45 kg , 0.75 kg	04 each
8.	Screw Driver set 15 cm, 20 cm, 25 cm, 30 cm,	04 each
9.	Compact screw driver set	02 each
10.	File brush (cleaning of file 15 cm, 20 cm)	04
11.	Pipe wrench set 25 cm.,	02 each
12.	Set of spanner DE 6 mm - 32 mm (set of 12)	04
13.	Electric Grinder (pedestal) 20 cm wheel roughs smooth with hand drill ground attachment	01
14.	Punches number 0-9 set, prick punch 15 cm, hollow punch 6-9 mm	02 set each
15.	Hand drilling machine 1/2 HP 2 - 8 mm	02
16.	Power drilling machine pillar sensitive 0-20 mm cap with swivel table machine with chuck 2 key	01
17.	set of drills bits	04
18.	Jack plane metal	04

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
19.	Tenon saw 12", 14"	04 sets
20.	Chisels	2 sets
21.	Smooth plane	04 sets
22.	Marking gauge	01
23.	Sprit level 15 cm	02
24.	Gas welding set Rectifier types 300-450 ampr. with accessories	
25.	Arc welding 33 A tig welding set complete 300 ampr AC/DC	01
26.	Hoses of different size	Assorted
27.	Earthing clamps	Assorted
28.	Cable lugs	Assorted
29.	Welding table	02
30.	Fire extinguisher	02
31.	Soldering iron 120 Watt	02
32.	Try square 15 cm	04
33.	Thickness gauge set	01
34.	Straight snip 25 cm	02
35.	Bent snip	02
36.	Various types of stakes	
37.	Oxygen cutting machine (Gas cutter)	01 set
38.	Power Hacksaw	01
39.	Hand shear universal 250 mm	04
40.	Anvil 50 Kg	
41.	Surface plate 90 x 60 x 90 cm with table	

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
42.	Rasp cut file	04
43.	Flooring tools	01 set
44.	L clamp	02
45.	Punch & drift set	02 sets
46.	Hand lever shearing machines	01
47.	First aid box	02
48.	Arbor press ½ ton	01
49.	Pipe bending machine (Hydraulic types) 12 mm, 30 mm	
50.	Instructor table	
51.	Instructor chain	
52.	Work bench 1800 x 1310 x 760 mm	04
53.	Almiriah 1820 x 1210 x 450 mm	02
54.	Metal Rack 1820 x 1520 x 450 mm	02
55.	Steel lockers with 8 drawers	02

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

B)	Furniture		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	05 Nos.
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	02 Nos.
	Trainees Locker	:	02 sets of 10
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.

## Module II

# Electrical Wiring and Electronics

### AIM

To develop professional skills in  
Operating, Testing, Repair & Maintenance  
of Electrical equipment & Electronics  
circuits used in Agricultural Machines

**DURATION 8 WEEKS**

## Module II – Electrical Wiring and Electronics

	Theory	Practicals
<b>Battery</b>	<ul style="list-style-type: none"> <li>• Construction of battery, working principle</li> <li>• Specifications, ratings</li> <li>• Series – Parallel connections</li> <li>• Electrolyte preparation, properties</li> <li>• Assembly and Disassembly procedures</li> <li>• Common defects and remedies</li> <li>• Use of hydrometer and voltmeter</li> <li>• Safety in handling acid</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly and disassembly</li> <li>• Measurement of voltage &amp; specific gravity</li> <li>• Electrolyte preparation &amp; filling</li> <li>• Charging</li> <li>• Repairs and maintenance</li> </ul>
<b>Dynamo</b>	<ul style="list-style-type: none"> <li>• Construction and operating principle</li> <li>• Functions of dynamo</li> <li>• Electrical terminations and connections</li> <li>• Maintenance of dynamo</li> <li>• Voltage &amp; current regulation</li> <li>• Faults and their rectification</li> <li>• Testing of dynamo</li> </ul>	<ul style="list-style-type: none"> <li>• Test the dynamo</li> <li>• Maintain commutator &amp; brushes</li> <li>• Dynamo connections and adjustments</li> <li>• Fault locations and rectification</li> </ul>
<b>Alternator</b>	<ul style="list-style-type: none"> <li>• Constructional details</li> <li>• Principle of operation</li> <li>• Functions of alternator</li> <li>• Method of voltage regulation</li> <li>• Testing procedures</li> <li>• Types of faults, maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Connect and test the alternator</li> <li>• Identify and rectify faults</li> <li>• Maintenance of alternator</li> </ul>

	<b>Theory</b>	<b>Practicals</b>
<b>Starters</b>	<ul style="list-style-type: none"> <li>• Type of starters</li> <li>• Construction and principle of working</li> <li>• Self starting circuits</li> <li>• Troubleshooting and maintenance</li> <li>• Testing procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Connections of starters</li> <li>• Testing of starters and associated circuits</li> <li>• Exercises on troubleshooting and maintenance</li> </ul>
<b>Motors</b>	<ul style="list-style-type: none"> <li>• Construction, specifications and working principles of AC Motors</li> <li>• Terminal details</li> <li>• Procedure of testing the motors</li> <li>• Maintenance of motors</li> <li>• Winding of motors – material selection for conductors and insulators, types of windings – procedures</li> <li>• Procedure of installation alignment and coupling of motors</li> <li>• Construction of submersible motors</li> <li>• Care and precautions in installation</li> </ul>	<ul style="list-style-type: none"> <li>• Test motors for proper functioning</li> <li>• Motor connections</li> <li>• Winding of motors</li> <li>• Maintenance of motors</li> <li>• Installation, alignment and coupling of motors with load</li> <li>• Installation of submersible motors</li> </ul>
<b>Tractor Wiring</b>	<ul style="list-style-type: none"> <li>• Different electric circuits in Tractor e.g. ignition light, horn, charging, dial and indicating circuits etc.</li> <li>• Methods of testing and troubleshooting</li> </ul>	<ul style="list-style-type: none"> <li>• Fault location, troubleshooting and remedies</li> <li>• Minor repairs in wiring and accessories</li> </ul>
<b>Electronic Circuits</b>	<ul style="list-style-type: none"> <li>• Electronic circuits in Agriculture machinery</li> <li>• Testing of components and circuits</li> <li>• Precautions</li> </ul>	<ul style="list-style-type: none"> <li>• Testing of components</li> <li>• Fault location in circuits</li> </ul>

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Scriber 150 x 4 mm	16
2.	Plier insulated 150 mm	16
3.	Screw Driver 150 mm	16
4.	Knife double bladed electrician	16
5.	Hammer, cross peen 115 grams with handed	16
6.	Electrician connector screw driver 100 mm Insulated Handle things stand	16
7.	Electrician testing pencil / in neon tester	16
8.	Heavy Duty screw driver 200 mm	16
9.	Electrician screw driver 200 mm	16
10.	Rule steel 300 mm	16
11.	Plier side cutting 150 mm	16
12.	Long nose insulated plier 15 cm	16
13.	Tweezers 10 cm insulated	16
14.	Screw Driver set of 6	08
15.	Adjustable spanner/ slide wrench 15-20 cis	08
16.	Pineer 15 cm	16



## Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Batteries 12V, 24V	02
2.	Hydrometer - 1250	06
3.	Cell tester 6 - 12 Volt	02
4.	Multimeter digital	03
5.	Battery charger 6 - 24 Volt	02
6.	Tractor dynamo	01
7.	Earth tester	01
8.	Test lamp	04
9.	Megger	01
10.	AC analog voltmeter	02
11.	Tractor alternator	01
12.	Single phase motor starters of different types	01 each
13.	Three phase motor starters of different types	01 each
14.	Single phase AC motor different types	01 each
15.	Three phase squirrel cage AC motors	01
16.	Tong tester	01
17.	Electrical tool kits	04
18.	Personal safety gear	04 sets
19.	Wire gauge	02

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
20.	Submersible, mono block pump motor	01 each
21.	Bearing pullers	02 sets
22.	Soldering iron	02
23.	Blow lamp	02 sets
24.	Air blower with heater	01
25.	Distilled water plant	01
26.	_____	01
27.	Armature rewinding machine	
28.	Tractor self starter 12 volt	

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

A)	Furniture		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	05 Nos.
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	02 Nos.
	Trainees Locker	:	02 sets of 10
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.

## Module III

### Tractor and Power Tillers

#### AIM

To develop skill in repairing,  
maintaining Tractor & power  
Tillers

**DURATION 8 WEEKS**

## Module III – Tractor and Power Tillers

	Theory	Practicals
<b>Tractor driving</b>	<ol style="list-style-type: none"> <li>1. Main parts of Tractor</li> <li>2. Functions of different parts</li> <li>3. Driving techniques, starting, turning, reversing, breaking &amp; stopping</li> <li>4. Driving regulations</li> <li>5. Precautions to be taken before and during driving</li> </ol>	<ul style="list-style-type: none"> <li>• Pre-check parts and functions before driving</li> <li>• Drive the tractor on different roads and fields with and without implements</li> <li>• Identification of abnormal functioning</li> </ul>
<b>Engines</b>	<ul style="list-style-type: none"> <li>• Parts of Engine</li> <li>• Working principle</li> <li>• Various systems in engines</li> <li>• Various clearances and tolerances</li> <li>• Overhauling procedures</li> <li>• Reconditioning and adjustment of components</li> <li>• Tuning, procedure</li> </ul>	<ul style="list-style-type: none"> <li>• Dismantle and assemble an engine</li> <li>• Measure and adjust clearances and tolerances</li> <li>• Overhauling of engine</li> <li>• Test and fine tune the engine</li> <li>• Repair and maintain various systems</li> </ul>
<b>Transmission system</b>	<p>Components and their functions</p> <ul style="list-style-type: none"> <li>• <b>Clutch</b> – Parts and operating principle, Types, Dismantling and assembly procedures</li> <li>• <b>Gear Box</b> – Types, components, Assembly, Adjustments, Lubricants</li> <li>• <b>Steering</b> – Types of steering system, components, front axles, power steering, servicing procedure</li> <li>• <b>Differential and final drive</b> – Functions, Principles of operation, Operational details, Adjustment and maintenance requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Test the components of a clutch for proper functioning</li> <li>• Dismantle and assemble a clutch.</li> <li>• Repair, test and adjust a clutch.</li> <li>• Disassemble and Assemble a gear box</li> <li>• Perform repair, adjustments and maintenance on                             <ul style="list-style-type: none"> <li>○ Gear box</li> <li>○ Steering</li> <li>○ Brakes</li> </ul> </li> </ul>

**Module III**

	Theory	Practicals
	<ul style="list-style-type: none"> <li>• <b>Brakes</b> – Classifications, Mechanical and hydraulic brakes, Assembly, Testing and troubleshooting</li> <li>• Types of defects in different components of transmission system</li> <li>• Precautions and safety</li> </ul>	<ul style="list-style-type: none"> <li>○ Differential</li> </ul>
<b>Hydraulic system</b>	<ul style="list-style-type: none"> <li>• Principle of hydraulic system,</li> <li>• Hydraulic component used in tractors</li> <li>• Hydraulics automation circuits</li> <li>• Adjustments and setting</li> <li>• Troubleshooting and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Operate hydraulic system of tractors</li> <li>• Maintenance and repairs hydraulic system</li> <li>• Implement controls</li> </ul>
<b>Power tillers</b>	<ul style="list-style-type: none"> <li>• Power tillers and their uses</li> <li>• Components of power tillers</li> <li>• Control and operational techniques</li> <li>• Matching farm machines/ implements and their adjustment</li> <li>• Types of defects, repair and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Drive and handle power tiller with and without implement</li> <li>• Repair, maintain and Adjust</li> </ul>

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Hammer ball peen 0.75 kg	16
2.	Chisel Cold flat 20 x 150 mm	16
3.	Centre punch 100 mm	16
4.	Caliper outside spring 150 mm	16
5.	Caliper inside spring 150 mm	16
6.	Steel rule 15 cm English & Metric	16
7.	Screw Driver 750 x 6 mm	16
8.	Screw Driver 100 x 8 mm	16
9.	Spanner D.E. set of 6.7 to 10 x 19 mm	16
10.	set of 7 ring spanner set of 7	16
11.	Plier combination 150 mm	16
12.	Hand file second cut 250 mm	16
13.	Feeler Gauge 20 Blade	16



## Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Marking out table 90 x 60 x 90 cm	01
2.	Prick punch 15 cm	04
3.	Blow lamp	02
4.	Dynamometer for performance testing of engine	01
5.	Carburetor (two different types)	02
6.	Chain and block 3050 sizes	01
7.	Chaser hand W/W 9 to 40 T.P.I. set of 11 external	01
8.	Chaser hard W/V 9 to 40 T.P.I. set of 11 external	01
9.	Chisel cross cut 9 x 3 mm	04
10.	Chisel diamond point 9 mm	04
11.	Chisel half round 9 mm	04
12.	Circlip plier 15 cm	02
13.	Compression gauge for diesel engine to read 0 to 115 kg/sq.cm and vacuum gauge 0 to 75 cm	01
14.	Cylinder gauge capacity 6 to 15 cm	01
15.	Desk or table	01
16.	Dial indicator to read 0.25 mm	02
17.	Distributor	02
18.	Dividers spring 15 cm	04

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
19.	Double open ended ignition spanner of B.A. 0 x 1	01
20.	Drill twist metric 3 to 12 x 1 mm	02
21.	Drill twist S.S. 1/8" to 1/2" x 1/64 set	02
22.	Drilling machine bench 1 H.P. to drill upto 12 mm dia	01
23.	Dynamo and voltage regulator	02
24.	Engineers square 15 cm blade	04
25.	Equipment puncture, in box	01
26.	Ex-tractor stud (EZYOUT TYPE)	01
27.	Feeler gauge	02
28.	File flat 20 cm smooth	04
29.	File flat 25 cm second cut	04
30.	File flat 35 cm bastard	04
31.	File flat safe edge 25 cm smooth	04
32.	File half round 40 cm second cut	04
33.	File square 20 cm second cut	04
34.	File square 30 cm rough	04
35.	File triangular 15 cm second cut	04
36.	Filing jig for adjusting the piston ring gap	01
37.	Fire buckets with stand	04
38.	Fire extinguisher	02

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
39.	Fuel pump	02
40.	Grover - 3 mm	01
41.	Grover - 4 mm	01
42.	Grover - 6 mm	01
43.	Gun, grease pressure	01
44.	Gun, paraffin set	01
45.	H.S.S. Hand reamers 3 to 19 mm in steps of 1.5 mm	01
46.	H.S.S. Hand reamers 3.5 to 12.5 mm in steps of 1.5 mm set of 12	01
47.	H.S.S. Hand reamers adjustable 11 to 12 mm	01
48.	H.S.S. Hand reamers adjustable 12 to 13 mm	01
49.	H.S.S. Hand reamers adjustable 13 to 15 mm	01
50.	H.S.S. Hand reamers adjustable 15 to 16 mm	01
51.	H.S.S. Hand reamers parallel 8 to 12 by 1.5 mm	02
52.	Hacksaw frame adjustable for 20-30 cm blades	04
53.	Hammer ball peen 0.25 kg	04
54.	Hammer ball peen 0.5 kg	04
55.	Hammer copper 1 kg with handle	04
56.	Hammer plastic 0.25 kg with handle	04
57.	Hammer, planishing	02
58.	Hand vice upto 3.75 cm	02

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
59.	Injector cleaning kit	02
60.	Fuel injection	02
61.	Injector testing set (Hand tester)	01
62.	Injector (two types)	02
63.	Lifting jack screw type 3050 kg	04
64.	Lockers with 8 drawers (standard size)	02
65.	Magnet spanner set	01
66.	Mattel (wooden)	02
67.	Metal rack 180 x 150 x 45 cm	01
68.	Micrometer outside 50 to 150 mm with extension rod	02
69.	Micrometer outside 0.25 mm	02
70.	Micrometer outside 0" - 1"	02
71.	Nose Pliers 15 cm (Round)	02
72.	Nose Pliers 15 cm (Straight)	02
73.	Oil can 0.12 ltr.	02
74.	Punch letters set 3 mm	01
75.	Ring expander and remover	01
76.	Ring groove cleaner	01
77.	Rule steel 30 cm to read inches and mm	04
78.	Safety goggles (Clear glass)	02

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
79.	Scrapper, bearing	04
80.	Scrapper, flat 25 cm handled	04
81.	Scrapper, half round 25 cm	04
82.	Scrapper, triangular 25 cm	04
83.	Screw driver electrician type 15 cm size	04
84.	Screw driver gauge with 22 pitches from 9 to 40 BTPI	02
85.	Scriber 15 cm	04
86.	Scribing block universal	02
87.	Set of mouse socket 0-1, 1-2 and 2-3	02
88.	Setting hammer	02
89.	Shovel	01
90.	Snip straight	02
91.	Soldering iron 120 watt	02
92.	Soldering iron, copper 280 gm (fire heated)	02
93.	Spanner, T-flax for screwing up and unscrewing in inaccessible position	01
94.	Spanner, double ended set of 12 metric sizes 8 to 32	01
95.	Spanner, for sparking plug 10 mm & 14 mm	04
96.	Spanner, socket, set of 8 handled, T-bar and ratchet 10, 12, 20 mm	02
97.	Spanner, adjustable 15 mm	02
98.	Spanner, clyburn 15 cm	02

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
99.	Spray gun set with accessories	01
100.	Stake grooving	02
101.	Stake, Ratchet	02
102.	Starter motor	02
103.	Steel almirah	01
104.	Stone, carborandum 15 x 5 x 4 cm smooth and rough	01
105.	Surface plat 60 x 60 cm	01
106.	Taps and dies complete set in box and metric	01
107.	Technometer (Counting type)	01
108.	Tool, valve grinding, screw in type	01
109.	Tool, valve grinding, suction in type	06
110.	Torque wrench (0 to 40 kg meter)	01
111.	Tray cleaning assorted sizes	08
112.	Twist drills for ratchet brace 6 to 20 by 1.5 cm	01
113.	V block pair with clamps 7.5 x 3.75 cm	02
114.	valve seat cutting, tools complete with guides and pilot bar (all angles)	01
115.	valve grinding machine	01
116.	valve spring compressor universal	01
117.	Vernier Caliper set 10" or 8" inside and outside, depth to read inches	01
118.	Water pump and oil pump	01
119.	Work bench 295 x 120 x 800 cm with 4 vice 12.5 cm jaw	04
120.	Air compressor 28 tage 500 ltr with 5 HP motor and air receiver	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
121.	Jig filer	01
122.	Wheel aliment gauge	01
123.	Tyre changer	01
124.	Hydraulic jack Hi lift type (Trolley type)	01
125.	Grinder with two 18 cm wheels with twist drill grinding attachment	01
126.	Tractor 1. Wheel type tractor 35 HP with hydraulic brake and steering gear 2. Wheel type tractor 45 HP with mechanical brake and floor gear position	01 01
127.	IC engine components as module	
128.	Power Tiller - 12 HP	
129.	Rear axle assembly gear box, steering box, assembly of diesel engine tractor	
130.	Tractor washer reciprocating type double piston electric operated with water tank and suitable hose pipe and nozzle	

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

A)	Space		
	Class Room	:	20-30 Sq. Mtr.
	Workshop	:	As required
B)	Furniture		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	-
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	-
	Trainees Locker	:	-
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.
C)	Teaching aids		
	OHP	:	01 No.
	Multimedia Projector	:	01 No.
	Lap Top / PC	:	01 No.
	Magnetic White Board	:	01 No.
	Display Board	:	01 No.

## Module IV

### Irrigation Machinery

#### AIM

To develop abilities to install, Test  
and maintain irrigation pumps,  
drip and sprinkler systems

**DURATION 8 WEEKS**

## Module IV – Irrigation Machinery

	Theory	Practicals
<b>Centrifugal pump</b>	<ul style="list-style-type: none"><li>• Water resources and irrigation system</li><li>• Water requirements of different crops</li><li>• Types of pumps</li><li>• Specifications and selection criteria for pump sets and accessories</li><li>• Centrifugal pumps – Construction and operating principles</li><li>• Installation, pipe fitting, operating procedures</li><li>• Maintenance and repair</li><li>• Troubleshooting, Correct coupling techniques</li></ul>	<ul style="list-style-type: none"><li>• Installation on foundation, alignment and grouting of pump</li><li>• Practice on pipe fittings</li><li>• Operations prior to starting the pump</li><li>• Periodic maintenance of pumps</li><li>• Troubleshooting, repair &amp; testing of pumps</li></ul>
<b>Submersible pumps</b>	<ul style="list-style-type: none"><li>• Problems of centrifugal pumps</li><li>• Construction and working principle</li><li>• Submersible pumps</li><li>• Installation procedures</li><li>• Tests to be conducted</li><li>• Methods of lowering in the bore operations before and after starting the pump</li><li>• Common troubles and their remedies</li></ul>	<ul style="list-style-type: none"><li>• Prepare platform and lower the pump</li><li>• Install the pump on platform and test</li><li>• Identification and repair of faults</li></ul>

	Theory	Practicals
<b>Reciprocating pumps (Hand pump)</b>	<ul style="list-style-type: none"> <li>• Constructional details</li> <li>• Shallow well and deep well reciprocating pumps</li> <li>• Repairs and troubleshooting</li> <li>• Proper upkeep and maintenance methods</li> <li>• Water table, recharging capacity</li> <li>• Market survey</li> </ul>	<ul style="list-style-type: none"> <li>• Installation on foundation, alignment and grouting of pump</li> <li>• Practice on pipe fittings</li> <li>• Change of coupling, foot valve, pipe</li> <li>• Check air leakage</li> <li>• Operations prior to starting the pump</li> <li>• Repair and periodic maintenance of pumps</li> <li>• Troubleshooting &amp; testing of pumps</li> </ul>
<b>Drip and sprinklers</b>	<ul style="list-style-type: none"> <li>• Importance of drip irrigation</li> <li>• Structure of drip system</li> <li>• Installation and layout</li> <li>• Types components, operation</li> <li>• Care and maintenance</li> <li>• Fertilizing with drip irrigation</li> <li>• Periodic maintenance of drip and sprinkler irrigation system</li> <li>• Sprinkler irrigation system</li> </ul>	<ul style="list-style-type: none"> <li>• Install the drip &amp; sprinkler system and test the system</li> <li>• Maintenance of components of drip &amp; sprinkler system</li> <li>• Adjust drip &amp; sprinkler system as per crop requirements</li> </ul>

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Steel rule 15 cm	16
2.	Hammer ball peen 0.75 kg	16
3.	Screw Driver 75 x 10 mm	16
4.	Screw Driver 30 x 1 cm	16
5.	Spanner D.E.set of 6 B.S.F.	16
6.	Plier combination 15 cm	16
7.	Hacksaw frame adjustable	02
8.	Measuring tape 30 mtr.	01 set

## Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
<ul style="list-style-type: none"> <li>• Centrifugal pumps</li> </ul>		
1.	Centrifugal pump coupled with electric motor	01
2.	Centrifugal pump coupled with IC Engine	01
3.	Centrifugal pump coupled with Monoblock	01
4.	Foundation frame (angle iron)	02
5.	Plumber tool kits	04
6.	Coupling	02
7.	Section and Delivery pipes	Asorted
8.	Foot valves	Asorted
9.	Tractor mounded 15 x 15 cms centrifugal type injection pump	01
<ul style="list-style-type: none"> <li>• Submersible pump</li> </ul>		
10.	Water proof cable	Asorted
11.	Section casing	Asorted
12.	Pump jackets of different size	Asorted
13.	Impeller	04

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
14.	Pump shaft	01
15.	Submersible pump with accessories	01 set
16.	Section case with strainer	02
17.	Non return valve	04
18.	Stage sleeve	04
19.	PVC pipes (different diameters)	Asorted
20.	Hand pump with complete fitting of different types	01 complete set
• Drip System		
21.	Vacuum breakers	02
22.	Pressure gauge	02
23.	Water meter	02
24.	Flush valve	02
25.	Pressure regulator	02
26.	Check valves	02
27.	Media filter	01
28.	Screen filter	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
29.	Disc filter	01
30.	Centrifugal filter	01
31.	Fertilizer unit	01
32.	Emitters	04
33.	Micro jet	04
34.	Micro sprinkler	04
• Sprinklers		
35.	Perforated pipes	Asorted
36.	Whirling sprinkler	02
37.	Rotary sprinkler	02
38.	Pop up sprinkler	02
39.	Aluminum pipe with quick coupling	Asorted
40.	Riser	02
41.	Take off valve, flow control valve	02 each
42.	Piper wrench 18", 24"	02 each
43.	Chain wrench 24"	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
44.	Pipe dies	01 set
45.	Pipe vice	01
46.	Chain puller block with tripod	02 tonnes
47.	Putter	01 set
48.	Holding clamps	01 set

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

<b>A)</b>	<b>Space</b>		
	Class Room	:	20-30 Sq. Mtr.
	Workshop	:	As required
<b>B)</b>	<b>Furniture</b>		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	-
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	-
	Trainees Locker	:	-
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.
<b>C)</b>	<b>Teaching aids</b>		
	OHP	:	01 No.
	Multimedia Projector	:	01 No.
	Lap Top / PC	:	01 No.
	Magnetic White Board	:	01 No.
	Display Board	:	01 No.

## Module V

### Crop Production Machinery

#### AIM

To develop proficiency in  
Installing, Adjusting, Operating, Troubleshooting &  
Maintaining of various Crop production machines

**DURATION 8 WEEKS**

# Module V – Crop Production Machinery

	Theory	Practicals
<b>Basic Farm operations</b>	<ul style="list-style-type: none"> <li>• Knowledge of different farm operations for various crops</li> <li>• Equipment used for different operations</li> <li>• Animal &amp; Tractor operated equipment</li> <li>• Precautions to be taken in handling equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of parts</li> <li>• Observation of operations</li> <li>• Handling of equipments</li> <li>• Precautions</li> </ul>
<b>Tillage</b>	<p>Primary and secondary tillage</p> <ul style="list-style-type: none"> <li>• <b>Primary tillage –</b> <ul style="list-style-type: none"> <li>○ Construction</li> <li>○ Operation care and maintenance</li> <li>○ Adjustments</li> <li>○ Functions of each</li> <li>○ Mould board plough, disc plough, plough, Accessories, Reversible disc plough</li> <li>○ Subsoilers</li> <li>○ Rotary tiller</li> <li>○ Rotavator</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Set up the plough</li> <li>• Overhaul and maintain tillage equipment</li> <li>• Adjust primary and secondary tillage equipment</li> </ul>

- **Secondary tillage –**
  - Construction
  - Operation, care and maintenance of harrow, cultivators
  - Adjustments to be made
  - Functions
  - Harrows
  - Different types of cultivators and levellers

**Sowing operations**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Types of seed drills</li> <li>• Construction features</li> <li>• Calibration of seed drill</li> <li>• Fertilizer metering mechanism</li> <li>• Operation procedures</li> <li>• Care and maintenance</li> <li>• Zero tillage</li> </ul> | <ul style="list-style-type: none"> <li>• Check &amp; adjust seed &amp; fertilizer drills</li> <li>• Calibrate seed &amp; fertilizer drill</li> <li>• Perform maintenance and repair on seed &amp; fertilizer drills</li> </ul> |
|---|--|

**Planters**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Planters, methods of planting,</li> <li>• Types of planters,</li> <li>• Constructional features.</li> <li>• Field operation and adjustment.</li> <li>• Troubleshooting in planters,</li> <li>• Special crop planters (potato, sugar cane, rice)</li> <li>• Maintenance</li> </ul> | <ul style="list-style-type: none"> <li>• Check &amp; adjust planters</li> <li>• Perform maintenance and repair on planters</li> <li>• Troubleshooting in planters</li> </ul> |
|--|--|

	<b>Theory</b>	<b>Practicals</b>
<b>Plant protection</b>	<ul style="list-style-type: none"> <li>• Classification and type of plant protection equipment, e.g. Sprayers, Dusters, Smoke generator, Fumigators etc.</li> <li>• Construction and use of sprayers, Dusters.</li> <li>• Storage and handling of chemicals</li> <li>• Operation, maintenance and troubleshooting of sprayers and dusters</li> <li>• Selection of plant protection equipment, safety precaution</li> </ul>	<ul style="list-style-type: none"> <li>• Check &amp; adjust plant protection equipment</li> <li>• Test the sprayers and Dusters for proper functioning</li> <li>• Clean tank and filter</li> <li>• Locate &amp; repair faults in plant protection equipment</li> </ul>

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Steel rule 30 cm	16
2.	Hammer ball peen 0.75 kg	16
3.	Chisel cold flat 20 cm	16
4.	Centre punch 10 cm	16
5.	screw driver 75 x 10 mm	16
6.	Screw driver 30 x 1 cm	16
7.	Spanner D.E. set of 6 B.S.F.	16
8.	Plier combination 15 cm	16
9.	Hand file second cut	16
10.	Prick punch 15 cm	02
11.	Chisel cross cut 9 x 3 cm	02
12.	Scriber 15 cm	02
13.	Scribing block universal	01
14.	Marking out table 90 x 60 x 90 cm	01
15.	Hacksaw frame adjustable	02
16.	V block	01
17.	Screw driver 15 cm	16

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
18.	File flat 35 cm bastard	01
19.	File flat 25 cm second cut	01
20.	File triangular 15 cm second cut	01
21.	File half round 40 cm	01
22.	File square 30 cm rough	01
23.	Drill twist metric 3 x 12 x 1 mm	01
24.	Taps and dies complete set in box B.A. type, B.S.W. type, American and metric type	01 set each
25.	H.S.S. Hand reamers 11-12, 12-13, 13-15, 15-16 mm	01 set each
26.	Scraper flat 25 cm	01 set each
27.	Nose pliers 15 cm round	01
28.	Nose pliers 15 cm straight	01
29.	Circlip plier 15 cm	01
30.	Spanner set (all sizes)	02 sets
31.	Torque wrench 0 to 20 kg meter	01
32.	Torque wrench 0 to 40 kg meter	01
33.	Ratchet brace	01
34.	Tray cleaning	16
35.	All key set of 12 pieces	02 set
36.	Feeler Gauge	02 set
37.	Spanner adjustable magnet spanner	01



## Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Power operated / Hand operated sprayers	02
2.	Power operated / Hand operated duster	02
3.	Ground nut digger	01
4.	Potato digger	01
5.	Disc harrow	01
6.	Seed cum fertilizer drill	02
7.	Off set disc harrow (mounted type)	01
8.	Cultivator (mounted type)	02
9.	Knapsack power sprayer with engine	01
10.	Tractor	01
11.	Power Tiller	02
12.	Tractor operated reaper	01
13.	Power operated paddy/ wheat thresher	02
14.	Power thresher for groundnut	01
15.	Tractor operated combine harvester	01
16.	Ditcher	01
17.	Rotavator	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
18.	Combine Harvester	01
19.	Power sprayer	01
20.	Old engine	02
21.	Mould board plough	02
22.	Disc plough	02
23.	Wheel hol	04
24.	Seed planter	01
25.	Rice planter - manual / engine operated	02

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

<b>A)</b>	<b>Space</b>		
	Class Room	:	20-30 Sq. Mtr.
	Workshop	:	As required
<b>B)</b>	<b>Furniture</b>		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	-
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	-
	Trainees Locker	:	-
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.
<b>C)</b>	<b>Teaching aids</b>		
	OHP	:	01 No.
	Multimedia Projector	:	01 No.
	Lap Top / PC	:	01 No.
	Magnetic White Board	:	01 No.
	Display Board	:	01 No.

## Module VI

### Post Harvest Technology

#### AIM

To develop expertise in  
Organising, Supervising and Operating hi-tech  
post-harvesting machines with efficiency & safety

**DURATION 8 WEEKS**

## Module VI – Post Harvest Technology

	Theory	Practicals
<b>Importance of Post-Harvest Technology</b>	<ul style="list-style-type: none"> <li>• Importance of post-harvest technology</li> <li>• Different terms used e.g. cleaning, grading, sorting, drying, storage, milling, handling and packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of equipment used locally</li> </ul>
<b>Cleaning and Grading</b>	<ul style="list-style-type: none"> <li>• Cleaners and graders – Hand and power operated</li> <li>• Cleaning efficiency, components of cleaners and graders</li> <li>• Common faults and corrective measures</li> </ul>	<ul style="list-style-type: none"> <li>• Installation of cleaners and graders</li> <li>• Cleaning and grading operations</li> <li>• Identify faults and rectify</li> </ul>
<b>Drying</b>	<ul style="list-style-type: none"> <li>• Importance of drying</li> <li>• Methods</li> <li>• Principle of drying</li> <li>• Drying equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Measurement of moisture contents</li> <li>• Practice on dryers</li> </ul>
<b>Milling</b>	<ul style="list-style-type: none"> <li>• Principle of milling, equipment used</li> <li>• Operations involved in various food products : (Wheat, Rice, Spices)</li> <li>• Adjustments and Troubleshooting of milling machines</li> </ul>	<ul style="list-style-type: none"> <li>• Handling and identification of parts of flourmill, dal mill, rice mill, huller</li> <li>• Adjustments and repairs</li> </ul>
<b>Primary processing equipment</b>	<ul style="list-style-type: none"> <li>• Equipment used e.g. sugar cane crusher, maize sheller, ground nut decorticators, spice mill, oil expellers</li> <li>• Location of faults</li> <li>• Safety</li> </ul>	<p>Handling and practice on the equipment</p> <ul style="list-style-type: none"> <li>• Fault identification and removal of faults</li> <li>• Safe operation</li> </ul>
<b>Storage and</b>	<ul style="list-style-type: none"> <li>• Need and importance of storage and packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Market survey of storage practices followed</li> </ul>

**Module VI**

	Theory	Practicals
<b>packaging</b>	<ul style="list-style-type: none"> <li>• Methods</li> <li>• Storage techniques for fruits, vegetables and grains</li> <li>• Cold storage, refrigeration</li> <li>• Packaging materials used</li> </ul>	<ul style="list-style-type: none"> <li>• Pack the given food products and seal</li> </ul>
<b>Threshing and Harvesting</b>	<ul style="list-style-type: none"> <li>• <b>Threshers :</b> <ul style="list-style-type: none"> <li>○ Working principle</li> <li>○ Constructional features</li> <li>○ Feeding systems</li> <li>○ Power threshers, installation and adjustments, maintenance, troubleshooting and safety</li> </ul> </li> <li>• <b>Reapers :</b> <ul style="list-style-type: none"> <li>○ Types of reapers, working principle</li> <li>○ Operation &amp; adjustment</li> </ul> </li> <li>• <b>Combine Harvester :</b> <ul style="list-style-type: none"> <li>○ Types</li> <li>○ Functions</li> <li>○ Construction</li> <li>○ Losses, minimising losses</li> <li>○ Maintenance before and after operations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Instal power threshers</li> <li>• Check &amp; adjust Threshing &amp; harvesting machinery</li> <li>• Maintain threshing &amp; harvesting machinery</li> <li>• Change faulty parts and repair threshing &amp; harvesting machinery</li> <li>• Care and maintenance of power threshers</li> <li>• Adjust and operate the reaper under field conditions</li> </ul>

## Tools & Equipment List

### Trainees Kit

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Steel rule 15 cm	16
2.	Steel rule 30 cm	04
3.	Hammer ball peen 0.75 kg	16
4.	Chisel cold flat 20 cm	16
5.	Centre punch 10 cm	16
6.	Screw driver 75 x 10 mm	16
7.	Screw driver 30 x 1 cm	16
8.	Spanner D.E. set of 6 B.S.F.	16
9.	Piler combination 15 cm	16
10.	Hand file second cut	16
11.	Prick punch 15 cm	02
12.	Chisel cross cut 9 x 3 cm	02
13.	Scriber 15 cm	02
14.	Scribing block universal	01
15.	Marking out table 90 x 60 x 90 cm	01
16.	Hacksaw frame adjustable	02
17.	V block	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
18.	Screw driver 15 cm	16
19.	File flat 35 cm bastard	01
20.	File flat 25 cm second cut	01
21.	File triangular 15 cm second cut	01
22.	File half round 40 cm	01
23.	File square 30 cm rough	01
24.	Drill twist metric 3 x 12 x 1 mm	01
25.	Taps and dies complete set in box B.A. type, B.S.W. type, American and metric type	01 set each
26.	H.S.S. Hand reamers 11-12, 12-13, 13-15, 15-16 mm	01 set each
27.	Scraper flat 25 cm	01 set each
28.	Nose pliers 15 cm round	01
29.	Nose pliers 15 cm straight	01
30.	Circlip plier 15 cm	01
31.	Spanner set (all sizes)	02 sets
32.	Torque wrench 0 to 20 kg meter	01
33.	Torque wrench 0 to 40 kg meter	01
34.	Ratchet brace	01
35.	Tray cleaning	16
36.	All key set of 12 pieces	02 set
37.	Feeler Gauge	02 set

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
38.	Spanner adjustable magnet spanner	01

## Equipment, Machine & Tools

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
1.	Hand Maize sheller (Tubular)	04
2.	Seed cleaner, grader	01
3.	Seed grader	01
4.	Solar dryer	01
5.	Wheat flour mil	01
6.	Solar water heater	01
7.	Solar cooker	02
8.	Groundnut decoricator hand operator	02
9.	Huller	01
10.	Mini rice mill	01
11.	Mini oil expeller	01
12.	Floor mill grinder	01
13.	Chaff cutter	01
14.	Sugar cane crusher	01
15.	Mini dal mill	01
16.	Packaging machine	01
17.	Storage Bin	01

Sl. No.	Item/ Specification	Quantity proposed for a batch of 16 trainees
18.	Dryer LSU	01
19.	Hammer mill	01
20.	Electric oven	01
21.	Moisture box	06 sets
22.	Electronic balance	01
23.	Physical balance	01
24.	Packaging material	Asorted

- Raw material and consumables are not included in the list.
- The tools and equipment required and listed in other modules are not included.

## OTHER REQUIREMENTS SUGGESTED FOR A BATCH OF 20 STUDTNES

(Space, Furniture & Teaching aids)

A)	Furniture		
	Class Room		
	<ul style="list-style-type: none"> <li>• Instructor Chair &amp; Table</li> <li>• Dual Desk</li> </ul>	:	01 No
		:	10 No.
	Workshop/Lab		
	<ul style="list-style-type: none"> <li>• Suitable work tables with 4 Vices</li> <li>• Stools</li> <li>• Discussion Table</li> </ul>	:	-
		:	20 Nos.
		:	01 No.
	Tool Cabinet	:	-
	Trainees Locker	:	-
	First Aid Box	:	01 No.
	Book Shelf ( glass panel )	:	01 No.
	Storage rack	:	01 No.

**GENERIC MODULE ON BASIC COMPUTER APPLICATION  
( 4 hrs per Week)**

<b>Practical</b>	<b>Theory</b>
<p>Booting the computer, opening windows menu, using the mouse, refresh computer desktop using right click of the mouse, create a directory in xp and linux, format a floppy, create a file using note pad, save the file in floppy, copy the file into hard disk, copy a file from hard disk to floppy, create a directory in floppy, create a directory in hard disk, use my documents, use start menu for opening an application, to open a document recently written, change control panel settings for display, change the volume name of the hard disks using system properties, familiarize with key boards and keys.</p>	<p>Introduction to Computer fundamentals and its parts, familiarizing with disk drives, Booting of a computer system, using the mouse, Right click, left click and use of operating systems like Windows XP, linux, menu system, tool bars, file structures, directories, moving and copying a file from floppy to hard disk, hard disk to floppy disk, creating directories. Formatting floppy disk.</p>
<p>Techniques of changing desktop wall paper, changing desktop screen properties, control panel, user accounts, customizing icons, writing a sample text using notepad, using paint for drawing figures to get accustomed with mouse. Saving a file. Using windows explorer, install a software, remove a software, add new hardware to the system (like a printer, change the system date and time, changing the regional settings of the system like country, currency, date format, using start menu, creating desktop short cuts</p>	<p>Use of desktop, control panel settings, explorer, regional settings, creating shortcuts, use of simple applications like paint, notepad,</p>
<p>Open internet explorer, change the settings in IE, customize internet explorer for default applications, enable cookies, change the security</p>	<p>Study of internet explorer, modem, settings in the IE and modem, dial up and broadband connections, outlook express, viewing E-</p>

<p>settings, set up an internet connection, user ID and password saving in the computer for future usage, set up outlook express for an e-mail account, setup server authentication settings, receive and send e-mail from the account. Search using Yahoo and Google for certain topics, download a file from the internet, save the download file. Set up the net meeting using MSN or Yahoo messenger</p>	<p>mail from the web site and outlook express, creating e-mail accounts, using search engines, video conferencing, MS chat</p>
<p>Open MS WORD, create a new file, save a file, open an exiting file, save as a text file type a paragraph, set for left and right margins, change the letters from upper to lower case, vice versa, cut a paragraph, copy a paragraph, setup tab positions, set hanging indents, draw a simple table, insert rows, insert columns, erase rows, erase columns, search the documents for spelling collections, print the letter in a printer attached, in portrait and landscape.</p> <p>Open excel, and workout the following to understand the theory commands: Prepare a salary bill for ABC organization with column A for names, column B for basic salary, column C for DA, column D for addition of B &amp; C to get the full salary. Add the column D into a new cell as TOTAL amount.</p> <p>Copy the sheet into sheet 2. Sort the sheet 1 as per names. Sort the sheet 2 as per Total salary. Insert two rows in sheet 1. Merge these rows. Enter heading as salary bill. Use borders ad shading for the entire used column.</p> <p>Print the sheet using set print area with margins, and use scale factor for reduction and enlargement. Use portrait and landscape.</p>	<p>Creating sample documents using MS WORD. Text wrapping, text formatting, changing letters to different case, drawing table, mail merging, page formatting, using different font types, printing a document</p> <p>Using excel as spread sheet, familiarizing with cells, formulae, text, numbers and date, using shortcuts for entering date and numbers in progressive cells, copying formulae, text and numbers, using borders, merging cells, unmerging, changing cell width, row height, printing an area of the sheet, options of printing like fit to paper, shrinking etc. using different in a workbook, changing colors of cells, fonts, text</p>

**Tools, Machinery & Equipments, etc. for a batch of 16 trainees**

Sl.No.	Item	Quantity
1	Pentium IV computer or latest with 512 MB RAM with following accessories DVD combo drive with latest X version, hard disk with 80 GB or above, 17" Monitor, AGP graphics card with 64 mb, 10/100 Ethernet card, Modem	8 Nos.
2	Centralized UPS of 1 KVA capacity or 4 UPS of 500 VA	
3	Laser Printer	1 No.
4	Dot Matrix Printer	1 No.
5	Windows XP operating system	As required.
6	M-S Office 2000	As required
7	Suitable computer tables, computer chairs	As required
8	Tool cabinet and trainees locker	2 each
9	Book Shelf (with glass panel)	1 No.
10	Shoe rack	As required
11	Vacuum cleaner	1 No.
12	Scanner	1 No.
13	Storage almera	As required

