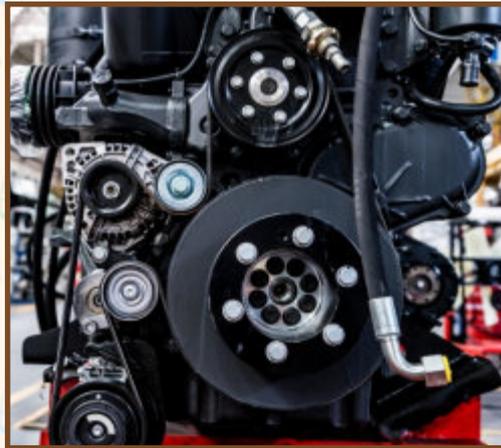




Skill India
कौशल भारत - कुशल भारत



Facilitator Guide



Sector
Agriculture

Sub-Sector
Agriculture Crop Production

Occupation: **Farm Machinery,
Equipment Operation and Maintenance**

Reference ID: **AGR/Q1108** Version **3.0**
NSQF **Level 4**

Tractor Service Mechanic



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Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”

Acknowledgements

We would like to thank all the experts and organisations who have helped us by reviewing the content and providing their valuable inputs for improving quality, coherence and content presentation. This facilitator guide will lead to successful roll out of the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome and appreciate any suggestions from users, industry and other stakeholders for any improvements in future.

About this guide

This trainer guide is intended to empower the trainer/facilitator to prepare the participant to become 'Tractor Service Mechanic' as per the Qualification pack (QP).

The objective of the guide is to provide an approach map for interacting with the trainees undergoing training on the job role. The aim of the course is to provide both theoretical and practical knowledge to the trainees, and also to guide them.

The guide is neither a substitute nor a complete road map, but an aid to help you to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the handbook. The guide is just to indicate that how to proceed for covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension.

Facilitator with the help of guide will be able to build among the participants:

- **Knowledge and understanding:** Satisfactory operational learning and comprehension to play out the required chore
- **Performance criteria:** Pick up the required aptitudes through hands on preparing and play out the required operational inside the predetermined measures
- **Professional skills:** Capacity to settle on operational choices relating to the zone of work

Symbols Used



Ask



Activity



Do



Demonstrate



Explain



Elaborate



Facilitation Notes



Field Visit



Learning Outcomes



Notes



Objectives



Practical



Resource



Summarize



Say



Team Activity



Exercise



Role Play

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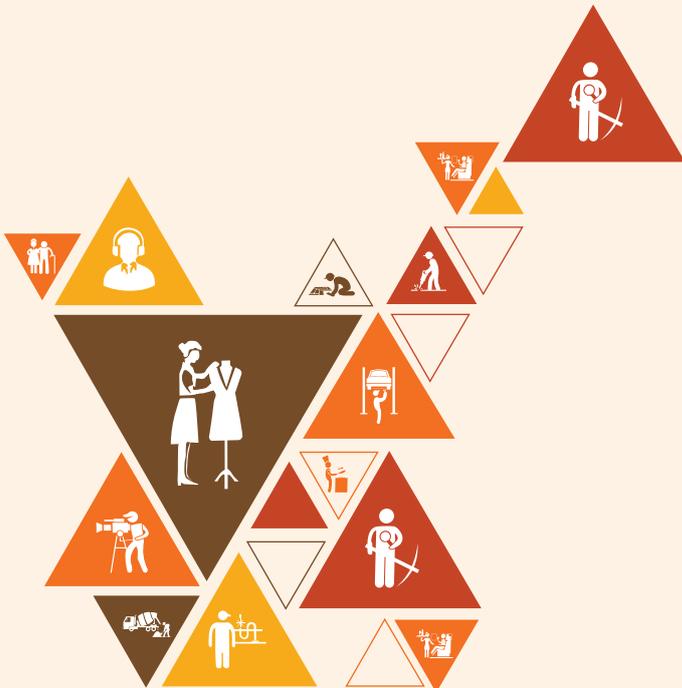
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1. Introduction and Orientation to the Role of a Tractor Service Mechanic

Unit 1.1 - Size and Scope of Agriculture Industry in India

Unit 1.2 - Roles and Responsibilities and Employment Opportunities of a Tractor Service Mechanic



Terminal Outcomes

After the completion of this module, participant will be able to:

1. State the role and responsibilities of a Tractor Service Mechanic

Key Learning Outcomes

After the completion of this module, participant will be able to:

1. Describe the size and scope of the Agriculture industry and its subsectors
2. State the role and responsibilities of a Tractor Service Mechanic
3. Identify various employment opportunities for a Tractor Service Mechanic in the Agriculture industry
4. Explain the importance of the individual's role in the workflow

Unit 1.1: Size and Scope of Agriculture Industry in India

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Recognize your fellow participants and build rapport with them
2. State the overall training outcomes of the programme
3. Describe the size and scope of the agriculture industry and its sub-sectors

Resources to be Used

- Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To acquaint participants with each other and to make them comfortable with one another as well as the Trainer.

Resources: Classroom space to accommodate participants in a big circle.

Methodology: Peer interaction, experience sharing.

Tentative duration: 30 minutes.

Expected outcome:

- Familiarize participants with one another as well as the Trainer.
- Educate participants about the training programme, its curriculum and its terminal outcomes.
- Set expectations with participants about the training programme.

Welcome the participants. Tell them that you would like to prepare them for an ice-breaker activity. Spend about 15 minutes on the activity and another 15 minutes in briefing them about the training programme.

- Get participants to form a circle. Join the circle. Begin with yourself.
- Say (a) your name (b) talk about your interest in this field and what inspired you to become a Trainer in this subject and (c) what you love about machines.
- After you finish, the person to your left must (a) introduce himself/herself (b) state why he/she chose to enrol for this course, 'Tractor Service Mechanic' and (c) name his/her favourite thing about dealing in machines. Ask persons who share the same reason, for point (b), to raise their hands.
- They must, then, introduce themselves one by one, speak about their interest in the subject. This way, participants will come to know of like-minded persons in their class.
- Continue to proceed leftward in the circle until all participants have introduced themselves in this manner. Once done, participants may take their seats.

Explain classroom etiquette such as punctuality to class, maintaining discipline, putting phones on silent, participating and not hesitating to ask questions in case of doubts. Further, speak about

what participants may expect from the training programme, the curriculum and briefly on career prospects for this job role. Do impress upon them, that they have indeed chosen the right field and are at the right place to skill themselves! With these opening remarks, proceed into the subject matter.

Do

Start with a leading question that intends to establish the need to study this unit.

Ask

Today, the biggest contributor to our country's GDP is the services sector. Yet the status, role and importance of the agriculture sector continue to be relevant in the Indian economy and also its contributions in international trade. How many of you agree and why?

Say

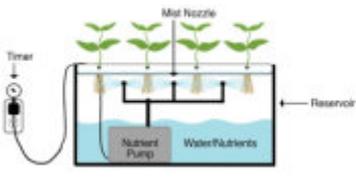
- Here are the responses to the above question:
 - Largest provider of employment and livelihood in rural India
 - Supplying raw materials to industries
 - Provides a market for industrial products
 - Earns foreign exchange
 - Source of revenue for the government
- Let us talk about the term agriculture and its various disciplines.

Elaborate

Elaborate on the techniques of geponics, hydroponics and aeroponics differentiating between the three types of systems. Cite examples of crops that can be grown using the three systems.

Do

- Conduct a quick quiz for learning confirmation.
- Using the presentation slide provided, show the pictures and descriptions given below.
- Looking at each of them, participants are to identify the type of technique, whether geponics, hydroponics or aeroponics.
- For your reference, the pictures and descriptions are given in correct order below.

		
<p>No growing medium required; roots suspended in a chamber and nutrient solution sprayed from below</p>	<p>Growing plants in nutrient solutions containing water and fertilizers</p>	<p>Plants embedded into soil</p>
<p>(Aeroponic)</p>	<p>(Hydroponic)</p>	<p>(Geoponic)</p>

Explain

Explain the contributions of agriculture sector in providing raw materials to industry and the various resources used in production of agricultural commodities.

Activity

Purpose: To assess prior knowledge of participants on the subject of agro-based industries.

Resources: Chits of paper.

Methodology: Collaboration and engaging with peers.

Tentative duration: 15 minutes.

Expected outcome:

- Ability to recognise contributions of agriculture sector in providing raw materials to industry.
- Ability of participants to collaborate with peers.

Prepare small chits of paper. Some chits will contain the names of raw materials, while others will have the names of the industry that uses the raw materials. Jumble up the chits and keep them in a bowl. Participants are to pick a chit from the bowl. Those with 'raw material' chits must pair up with their corresponding 'industry' chit counterparts. Allow 10-15 minutes for this activity.

The names of industries and raw materials are given in the table below for your reference:

Industry	Raw materials			
Textile	Cotton	Woollen	Silk	Jute
Beverages	Tea	Coffee		
Dairy	Milk	Butter	Cheese	
Sugar cane	Sugar	Gur		
Canning industry	Fruit production			
Oil	Coconut	Mustard	Groundnut	

- Conclude the activity by talking about the importance and contribution of agro-based industries in India and the various resources used in production of agricultural commodities.

Explain

Speak about the various landmark achievements in the field of agriculture, and how they helped India become self-sufficient, by quoting some statistics.

Elaborate

- Elaborate on the following:
 - Story of green revolution in India; how it began, role of Dr MS Swaminathan as the architect of the green revolution in India.
 - Dr Verghese Kurien's journey in spearheading the white revolution in India.
 - Yellow revolution that led to an increase in the production of edible oil to achieve self-sustenance.
 - Blue revolution that resulted in increase in the overall fish production in a responsible and sustainable manner for economic prosperity.

Explain

- Explain the different sub-sectors of agriculture and the branches therein. Familiarise the participants with the terms used.
- Explain the significance of agriculture sector and how it contributes to the GDP of the economy.

Ask

As a Tractor Service Mechanic, which sub-sector/branch of agriculture do you fall under?

Elaborate

Speak about its inclusions in detail.

Notes for Facilitation

- Additional E-resource:
 - History of green revolution (in Hindi), Duration 8.41 mins.
<https://www.youtube.com/watch?v=uWIMCgRh2Xw>
- Conclude the session by speaking a little more about agricultural engineering, an important branch of agriculture that is relevant to participants, as aspiring Tractor Service Mechanic.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise



Key Solutions to PHB Exercises

A. Match the Columns

1. d. Led to increase in milk production
2. c. Led to increase in food grain production
3. a. Led to increase in fish production
4. b. Led to increase in oilseeds production

B. Multiple Choice Questions

1. a. Farm mechanisation
2. a. Crop production
3. c. Horticulture
4. c. Animal husbandry

Unit 1.2: Roles and Responsibilities and Employment Opportunities for a Tractor Service Mechanic

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Discuss the role and responsibilities of a Tractor Service Mechanic
2. Identify various employment opportunities for a Tractor Service Mechanic
3. Explain the importance of the individual's role in the workflow

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible)

Ask

Set the context of the session by asking a question, 'Who is a mechanic?' or 'What is mechanics?' Collect all responses and build on the correct responses.

Say

Mechanics is all about repairing and maintaining machines and the person who does the repair work is called a 'mechanic'. This way, a person who repairs and maintains a tractor is called a tractor mechanic. Tractor service mechanics are specialists in repairing and servicing tractors and other farm machinery. As a tractor mechanic, you must have an extensive knowledge of tractor parts and other farm equipment used for farming.

Ask

Why do you want to be a Tractor Service Mechanic? Have you ever had an opportunity to repair any machines or a vehicle? If so, what attributes do you think a Tractor Mechanic should have?

Explain

Explain the responsibilities of a Tractor Service Mechanic and the need for the attributes like mechanical reasoning, analytical thinking, problem-solving skills, communication skills, good hand-eye coordination and detail-oriented for taking up the role in detail.

Elaborate

Use the presentation slide and explain about the different job roles and the wide scope that a tractor service mechanics have in various industries.

Activity

Purpose:

- To create awareness about the different sectors that can offer employment to the 'Tractor Service Mechanic'.
- To list the tasks that can be performed as a tractor service mechanic in each sector.

Resources: Presentation slide, chits of paper, a plastic box, music.

Methodology: Game.

Tentative duration: 15 minutes.

Expected outcome:

- Ability to identify the sectors that can offer employment to a tractor service mechanic.
- Ability to list the tasks that can be performed as a tractor service mechanic in each sector.

On chits of paper write the names of the different employment sectors. You may have to repeat the names of the sectors depending on the batch size. Fold and place the chits of papers in a box. Ask the participants to stand in a circle. Play the music. Ask the participants to pass the parcel (the box of chits) around. Stop the music at a point. Ask the participant who is holding the box to open and remove a chit. Ask them to read the name of the sector and then tell what work they will do as a tractor service mechanic in that sector. Play the game till all the participants have received the parcel.

- At the end of the game show them the slide with the list of the employment sectors. Conclude the activity by adding your comments on each sector and the tasks and jobs that a tractor service mechanic may do in these sectors.
- For your reference the name of the sectors is given below:

Employment sector	Role (s)
Indian railways	<ul style="list-style-type: none"> • Loco pilot and technician
Ordnance and vehicle factory	<ul style="list-style-type: none"> • Technician
Forest and horticulture	<ul style="list-style-type: none"> • Technician
TI and other national training institutes Automobile manufacturing companies	<ul style="list-style-type: none"> • Instructor • Automobile mechanic • Technician in production plants • Workshop mechanic • Service managers • Auto parts manager
Automobile insurance companies	<ul style="list-style-type: none"> • Insurance agent • Inspection officer
Self-employment: Trade service mechanics can start their own vehicle dealership, business or workshops	

Say 

Now, let's discuss workflows.

Ask 

What is your understanding of the term, 'workflow'?

Say 

- Workflow means a series of steps taken to complete a task. There can be various types of workflows based on the needs of a business.
- Use a real-life example, for example 'workflow of buying a tractor', to help participants relate to the concept. You can use any other example for the purpose. Use sample chart in the presentation slide to show how a workflow may look like.

Ask 

What is the importance of workflows?

Explain 

Explain the benefits of workflows in detail.

Notes for Facilitation 

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Mechanical reasoning, analytical thinking, problem-solving skills, communication skills, good hand-eye coordination, detail-oriented
2. Indian railways, ordnance and vehicle factory, forest and horticulture, ITI and other national training institutes, automobile manufacturing companies, automobile insurance companies

B. Multiple Choice Questions

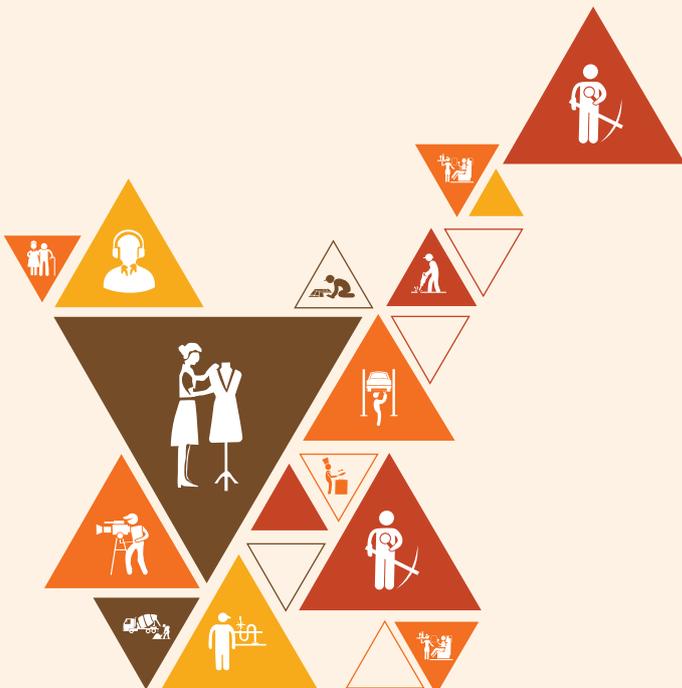
1. a. Series of steps taken to complete a task
2. a. Removing unimportant tasks from a process

2. Preparation for Carrying Out Tractor's Repair and Maintenance

Unit 2.1 – Types and Components of a Tractor

Unit 2.2 – Dangerous Machines (Regulation) Act 1983

Unit 2.3 – Repair and Maintenance of Tractors



AGR/N1126

Terminal Outcomes

After the completion of this module, the participant will be able to:

1. Identify the tools and equipment required for the repair and maintenance of a tractor
2. Describe the pre-repair and maintenance activities to be undertaken

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain the design and functions of different types of tractor 2. Explain the basic terminology used for various tractor components and systems. 3. Explain the Dangerous Machines (Regulation) Act 1983 4. State the importance of checking the previous repair and maintenance records. 5. List the tools and equipment required for the repair and maintenance of a tractor 6. Explain the importance of using the manufacturer-approved tools and equipment for the repair and maintenance of a tractor 7. Identify the appropriate conditions to carry out repair and maintenance of a tractor 	<ol style="list-style-type: none"> 1. Identify the given tractor's manufacturer and model correctly 2. Demonstrate the activities involved in the preparation for the repair and maintenance of the tractor 3. Demonstrate the correct use of the relevant tools, equipment and Personal Protective Equipment (PPE)

Unit 2.1: Design and Function of Different Types of Tractors

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the design and functions of different types of tractor
2. Explain the basic terminology used for various tractor components and systems
3. Identify the given tractor's manufacturer and model correctly

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Start with a leading question of your choice that intends to establish the need to study this unit

Ask

Do you think tractors, like cars, can be of different types or it's a standard multipurpose vehicle?

Say

For various agricultural operations, the necessary farming machinery and implements are developed. Similarly, according to the farmer's needs and demand, many types of tractors are developed.

Explain

Show the presentation slides with different types of tractors and explain the usage of each in detail.

Ask

If you have ever seen a tractor before, can you recall what different components it has? Even if you have not seen one, what do you think various components of a tractor are?

Explain

- Use the presentation slides and explain tractor components and elaborate the functionality of each component.
- Explain the factors that should be considered while selecting the right tractor for various farming needs.

Field Visit

Purpose: To identify the different tractor manufacturers and models correctly.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 7 hours.

Expected outcome: Participants will be able to identify the different tractor manufacturers and models correctly.

- Arrange a field visit to tractor agencies.
- At the agency, ask participants to collect information on the following:
 - Different types of tractors in India
 - Different tractor manufacturers in India
 - Pricing of tractors
 - Usage of different types of tractor
 - Pros and cons of different types of tractors
 - Right way to choose a tractor
- After participants return to the class, they will share their experience and the information collected with the class.

Field Visit

Purpose: To identify the different components of a tractor.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to identify different components of a tractor.

- Arrange a field visit to a tractor workshop.
- At the location, ask participants collect information on the following:
 - Different tractor components
 - Function of each component
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Show them a video using the link, "<https://www.youtube.com/watch?v=4EHjHcyB9yY>" and emphasis on the importance of selecting the right tractor.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Utility tractors, compact tractors, row crop tractors, industrial tractors, garden tractors, implement carrier tractors, earth moving tractors, two-wheeler tractors
2. I.C. engine, clutch, transmission gears, rear wheels, front wheels, steering mechanism, hydraulic control and hitch system, differential units, brakes

B. Match the Columns

1. d. Connects and disconnects tractor engine from wheels
2. c. Controls gears in the tractors
3. a. Governs the angular movement of the front wheels
4. b. Stops or slows down the motion of a tractor

C. Match the Columns

1. b. Utility tractor
2. d. Industrial tractor
3. a. Row crop tractor
4. c. Earth moving tractor

Unit 2.2: Dangerous Machines (Regulation) Act 1983

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the Dangerous Machines (Regulation) Act 1983

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

Do you think the Indian government or the Indian tractor manufacturers can be held responsible for the unsafe tractor operations?

Explain

Explain the importance of the 'Dangerous Machines (Regulation) Act 1983'.

Team Activity

Purpose: To create awareness about the clauses of the 'Dangerous Machines (Regulation) Act 1983'.

Resources: Presentation slides, Pen and paper.

Methodology: Discussion.

Tentative duration: 90 minutes.

Expected outcome: Participants will be able to know the clauses of the 'Dangerous Machines (Regulation) Act 1983'.

- Divide the participants into groups of 4-5 depending on the batch size.
- Ask them to go through the act from the participant handbook and make note of the key points of the act.
- Ask one group to present the key points before the class and discuss the act.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. According to the Central Government of India, a 'dangerous machine' refers a machine that can cause accident during its operation.

B. Match the Columns

1. a. Use of any machine classified as 'dangerous machines'
2. a. Central government

Unit 2.3: Repair and Maintenance of Tractors

Unit Objectives

After the completion of this unit, the participant will be able to:

1. State the importance of checking the previous repair and maintenance records
2. List the tools and equipment required for the repair and maintenance of a tractor
3. Explain the importance of using the manufacturer-approved tools and equipment for the repair and maintenance of a tractor
4. Identify the appropriate conditions to carry out repair and maintenance of a tractor
5. Demonstrate the activities involved in the preparation for the repair and maintenance of the tractor
6. Demonstrate the correct use of the relevant tools, equipment and Personal Protective Equipment (PPE)

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

- Do you remember if in your homes any electronic items failed repeatedly despite repairs? If so, do you know the details of every fault and how it was fixed?
- Collect all responses and build on it to bring them to the maintenance record kept at the tractor workshops.

Say

A maintenance record or a maintenance log is the document that maintains the record of the asset maintenance activities. In other words, it keeps the track of all the repairs done on assets, which in this case are tractors and other farm machinery. It is a part of health and safety management. There is no single format for a maintenance log; however, broadly it includes the following information.

Explain

Show the presentation slides and explain the generic details of a maintenance log and a sample template shown in a slide.

Demonstrate

- Bring real-time maintenance log in the class and show the sample to the participants.
- Show participants how to fill the template by filling up one page.
- Estimated time for demonstration is 0.5 hour.

Activity

Purpose: To train participants to fill a maintenance record.

Resources: Presentation slides; Paper and pen, Sample maintenance record from a workshop.

Methodology: Learning by doing.

Tentative duration: 0.5 hour.

Expected outcome: Participants will be able to fill up a maintenance log.

- This is an individual activity. Give participants a scenario of a tractor repair. Ask them to fill the details of the repair given in a scenario. Pick a few participants and ask them to explain their records to the class. Discuss any challenges while up the template.

Explain

Use the presentation slide and explain the advantages of maintenance record.

Activity

Purpose: To familiarise participants with the different types of tools used for farm maintenance and repair.

Resources: Presentation slides.

Methodology: Quiz.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to identify different types of tools used for farm maintenance and repair.

- Show the participants the presentation slides with 4 quiz questions. Ask them to look at the pictures of the tools and identify their names and usage.
- Give them enough time to respond. Note the response. Now, show them the presentation slides with the answers.

Explain

Explain the tools in details and their usage in details using the presentation slide.

Ask

Do you think there is any difference between the original and duplicate brands? What are the advantages and disadvantages of each? Collect all responses.

Say

A machine is an assembly of various parts. Automobile manufacturers source different parts from different companies for manufacturing their vehicles. The companies that supply these parts to the vehicle manufacturers are called original equipment manufacturers, commonly known as OEMs. For any business that is into maintenance and repairs, it is always best to use OEM parts. But sometimes, a business may be caught in between making a hurried order from the OEM or outsource from the local suppliers to handle the orders for unexpected breakdowns. In such a situation, most businesses prefer to choose to outsource from the local suppliers, not knowing its financial implications. Knowing the benefits of using OEMs can help in many ways

Demonstrate

- Bring a few original and duplicate parts of a tractor and demonstrate the difference between the original and duplicate.
- Discuss the advantages of OEMs and the basis for OEM selection using the presentation slides.
- Estimated time for demonstration is 2 hours.

Field Visit

Purpose: To identify different types of tools used in the tractor maintenance and repair.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to identify different types of tools used in the tractor maintenance and repair.

- Arrange a field visit to a dealer who sells tools for vehicle maintenance and repair.
- Ask participants to enquire about different types of tools used in maintenance and repair in general and specific to the tractor maintenance and repair.
- Ask them to create the list of tools and their usage.
- After the participants return to the class, they will share their experience and the information with the class.

Team Activity

Purpose: To acquaint participants with the basic conditions for tractor maintenance and repair.

Resources: Presentation slides; Pen and paper.

Methodology: Discussion.

Tentative duration: 30 minutes.

Expected outcome: Participants will be able learn the basic conditions for tractor maintenance and repair.

- Divide the participants into groups of 4-5 depending on batch size. Ask them to discuss the basics of tractor maintenance and repair. Ask all groups to list down the frequency of repairing/replacing important tractor parts. Discuss a few key points and explain the importance of regular maintenance and repair.

Explain

Explain the list of components to be checked regularly and the frequency of repairing/replacing important tractor parts using presentation slides.

Demonstrate

- Take the participants to the lab facility which has tractors and demonstrate them how to inspect various tractor components and the next steps to fix the issues identified.
- Estimated time for demonstration is 6 hours.

Field Visit

Purpose: To observe the real-time conditions for maintenance and repair at the workshop.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to observe the real-time conditions for maintenance and repair at the workshop.

- Arrange a field visit to a tractor workshop.
- Ask participants to observe the workings of a real-time service mechanic and take notes.
- After participants return to the class, they will share their experience and the information with the class.

Field Visit

Purpose: To practice inspecting various consumable products—filters fluids and other systems—of a tractor.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to practice inspecting various consumable products—filters fluids and other systems—of a tractor.

- Arrange a field visit to a tractor workshop/garage. They can visit the same workshop that visited on the previous day.
- Divide the participants into 4-5 batches.
- Ask each batch to inspect the specific parts and record their observations. For example, one batch may inspect all filters in a tractor; another may inspect all hoses and belts in a tractor.
- While inspecting, they can record the following information:
 - Is the condition of the garage appropriate to carry out maintenance and repairs of tractors there? For example, is the place hazard free; well-ventilated; prepared for medical emergencies etc.?
 - Are the mechanics in the workshop using the PPE?
 - What is the age of the inspected parts?
 - When were the parts inspected last serviced/replaced?
 - Do the parts inspected have any problems currently?
 - Do the parts inspected need to be repaired or replaced to fix the identified issues?
 - What is the root causes of the issues identified?
 - How could the issues have been prevented from occurring?
- After participants return to the class, they will share their experience and information with the class

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Benefits of maintenance record:
 - Prevents expensive repairs
 - Increases safety
 - Helps timely replacement
 - Reduces labour workload
 - Helps manage each machine
2. Benefits of OEM parts:
 - Guaranteed quality parts
 - Manufacturer's warranty
 - Value
 - Easy component availability
 - Best customer service
 - Competent prices
 - Fast production
 - Durability
3. Factors to be considered while selecting an OEM:
 - Expertise and capabilities
 - Track record
 - Quality
 - Pricing
 - Communication
 - Licensing
 - Flexibility

B. Match the Columns

1. b. Wrench
2. a. Socket
3. d. Screwdrivers
4. c. Gear pullers

C. Match the Columns

1. c. Before start up
2. b. Every 10 hours
3. a. Every 200 hours
4. e. Every 500 hours
5. d. Every 2 years

D. Multiple Choice Questions

1. a. Original Equipment Manufacturer
2. b. Socket
3. a. Wrenches
4. d. Gear puller

3. Routine Checks on the Tractor

Unit 3.1 – Pre-operational Checks for Tractors

Unit 3.2 – Common Faults with Tractor Systems

Unit 3.3 – Recommended Levels of Fluids in a Tractor

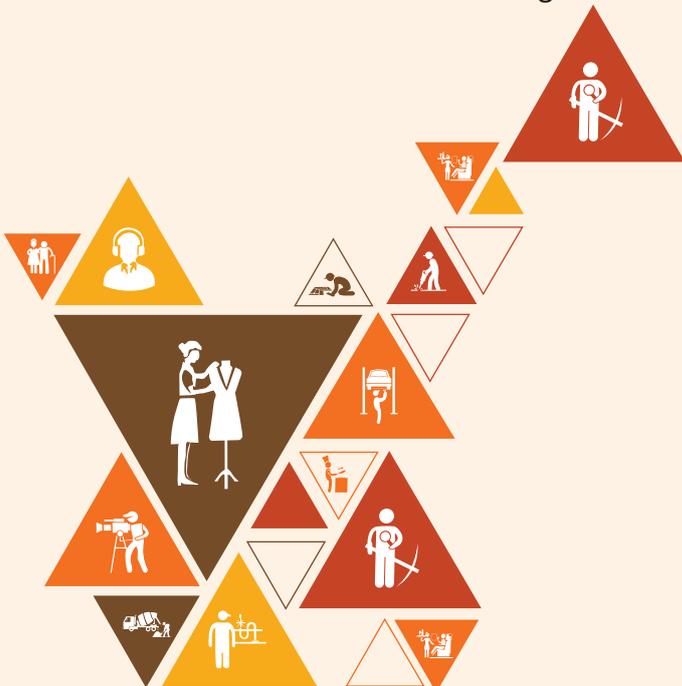
Unit 3.4 – Power Transmission System: Clutch

Unit 3.5 – Power Transmission System: Brakes and Gears

Unit 3.6 – Power Transmission System: Transmission System

Unit 3.7 – Power Transmission System: Suspension System

Unit 3.8 – Removing Air from a Diesel Fuel System



Terminal Outcomes

After the completion of this module, participant will be able to:

1. Describe the process of conducting routine checks on a tractor
2. Demonstrate the process of conducting routine checks on a tractor

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Describe the process of performing routine checks on a tractor 2. Explain different systems of a tractor and common faults experienced with them. 3. Explain the process of identifying faults with clutch, gears, breaks, steering and various tractor implements 4. State the recommended level of engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel 5. Identify different types of breaks, electrical systems, clutches and steering systems 6. Describe the process of checking for bleeding or airlocks in the fuel system a tractor 	<ol style="list-style-type: none"> 1. Demonstrate the process of examining the clutch, gears, brakes and steering for correct functioning 2. Assess the fan belt for the prescribed level of tension 3. Assess the engine oil, hydraulic oil, transmission oil, coolant and fuel for the prescribed levels 4. Analyse the transmission, hydraulic and steering system for leakage 5. Demonstrate the process of examining the tractor implements such as harrow, rotavator, seed drills for correct functioning 6. Evaluate the performance of temperature gauge, low oil pressure warning lamp and hour meter

Unit 3.1: Pre-operational Checks for Tractors

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the process of performing routine checks on a tractor

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (optional).

Ask

- We humans have regular vaccinations and check-ups to keep our health up to date and ensure that our body is functioning well. Do you think non-living things such as tractors also require check-ups to ensure that they are working well?
- Collect all responses and build on that.

Say

- Regardless of the number of years of farming experience you may have, before heading out to the field, it is important to perform pre-operational checks of the tractors. This helps in preventing costly repairs, down time and aggravation.
- Use the presentation slides and show the daily tractor maintenance checklist and explain each pointer.

Notes for Facilitation

- Show them a video using the link, "<https://www.youtube.com/watch?v=BfWyLXHk1yg>" and emphasis on the common tractor maintenance checkpoints.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Daily tractor inspection checklist
 - Fluid levels
 - Tires and wheels
 - Batteries
 - Operator's platform area
 - Slow moving vehicle (SMV) emblem
2. Generic checks for tractor inspection:
 - Frayed or worn fan belt
 - Cracked or broken parts
 - Leaking or damaged hoses
 - Loose parts, bolts, or nuts
 - Grease or mud on the steps
 - Missing/misplaced/damaged shields
 - Charging of the fire extinguisher

B. Fill in the Blanks

1. Slow Moving Vehicle
2. Roll Over Protection System

Unit 3.2: Common Faults with Tractor Systems

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain different systems of a tractor and common faults experienced with them.
2. Explain the process of identifying faults with clutch, gears, breaks, steering and various tractor implements.
3. Demonstrate the process of examining the clutch, gears, brakes and steering for correct functioning.
4. Assess the fan belt for the prescribed level of tension.
5. Assess the engine oil, hydraulic oil, transmission oil, coolant and fuel for the prescribed levels.
6. Analyse the transmission, hydraulic and steering system for leakage.
7. Demonstrate the process of examining the tractor implements such as harrow, rotavator, seed drills for correct functioning.
8. Evaluate the performance of temperature gauge, low oil pressure warning lamp and hour meter.

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

Use the presentation slides and show various tractor systems, common faults with tractor systems, tractor maintenance checklist.

Demonstrate

- Take the participants to a lab/demonstration area to show how to inspect the following components of a tractor for correct functioning:
 - Fluid levels
 - Tyres and wheels
 - Batteries
 - Operator's platform area
 - SMV emblem
 - Hoses and belts
 - Oil pressure and levels
 - Battery
 - Filters
 - Lights/flashers etc.
- Tell participants how to identify issues with the above components and the next steps to fix the identified issues.

- Also, show participants working of implements such as harrow, rotavator, seed drills, etc.
- Allow participants to practice the steps demonstrated.
- Estimated time for demonstration is 6.5 hours.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

- Objective of farm mechanisation:
 - Reduces the labour force in the agriculture sector
 - Increases productivity
 - Improves the quality of field operations
 - Optimises on-time tillage operations
- Tractor systems
 - Engine
 - Lubrication system
 - Transmission system
 - Hydraulic system
 - Ergonomic tractor design
- Common faults with tractor systems
 - Dull blades
 - Fuel system issues
 - Electrical issues
 - Engine troubles

B. Fill in the Blanks

- Nudging system; automatic position control system; automatic draft control system
- John Deere; Escorts; Swaraj; Sonalika; Mahindra
- Universal tractor oil

C. Multiple Choice Questions

- d. High torque, low speed
- a. Twice a year
- b. 12 o'clock position

D. State Whether True or False (T/F)

- True
- True

Unit 3.3: Recommended Levels of Fluids in a Tractor

Unit Objectives

By the end of this unit, you will be able to:

1. State the recommended level of engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (optional).

Explain

Use the presentation slides and explain the importance of high quality tractor fluids, right universal tractor transmission oil, filter changes, coolants.

Field Visit

Purpose: To help participants recognise the various fluids required for by a tractor.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will research about different types of HD tractor fluids available in the market and the advantages of using HD fluids.

- Arrange a visit to the nearby tractor oil suppliers and a workshop.
- Divide the batch into two groups.
- Ask one group to visit different oil suppliers in their area and investigate the following:
 - Different types of tractor oils and other fluids (coolants, filter oils, engine oils, transmission oils, steering box oil etc.) available in the market.
 - Pricing of tractor oils and other fluids
 - Most commonly used tractor oil and fluids
 - Pros and cons of regular tractor oils and HD oil
 - Right universal tractor transmission oil and its importance
 - Three labels of universal tractor transmission oil
 - Different oil weights and specifications
- Ask another group to visit a workshop and learn how to check the:
 - Engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel for the prescribed levels

- Temperature gauge for correct functioning
 - Low oil pressure warning lamp
 - Hour meter for correct functioning
 - the engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel for the prescribed levels
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Optimises the performance of tractors; helps in oxidation resistance; reduces heat; optimises maintenance cost
2. Inspect the levels and condition of all fluids; check the quality of fluids on the dipstick; look for any creaminess or signs of water in the oil

B. Match the Columns

1. b. 32
2. c. 68
3. a. 100

C. Multiple Choice Questions

1. a. Trans-hydraulic fluids
2. b. Separate fluids

D. Fill in the Blanks

1. International Organization for Standardization
2. Anti-wear properties
3. Society of Automotive Engineers

E. State Whether True or False (T/F)

1. False
2. True
3. True

Unit 3.4: Power Transmission System: Clutch

Unit Objectives

By the end of this unit, you will be able to:

1. Identify different types of clutches

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (optional).

Activity

Purpose: To familiarise participants with the components of a tractor's power transmission system.

Resources: Presentation slides.

Methodology: Quiz.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to identify the components of a tractor's power transmission system.

- Show the participants the presentation slides with 6 quiz questions. Ask them to look at the pictures of the tools and identify their names and usage.
- Give them enough time to respond. Note the response. Now, show them the presentation slides with the answers.

Explain

Use the presentation slides and explain the details of different types of clutches.

Notes for Facilitation

- Show them a video using the link, https://www.youtube.com/watch?v=T7es2m7tf_A and discuss the video.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Components of a power transmission system:
 - Clutches and brakes
 - Transmission gears
 - Differential
 - Final drive
 - Rear axle
 - Rear wheels
2. A clutch engages and disengages the tractor engine from the transmission gears and drive wheels. A clutch should have the following features:
 - Ability of taking load without dragging, grabbing and slipping
 - Higher capacity to transmit maximum power without slipping
 - Convenient, accessible and easy to operate, adjust and repair
 - Heat resistant friction surface
 - Easy control by hand lever or pedal lever

B. Match the Columns

1. b. One part turns the other by the friction between them
2. c. Metal disk with a conical peripheral surface that engages with a similarly shaped recess in the flywheel
3. d. Simple clutch with square jaws
4. a. Consists of a driving member and a driven member—an impeller with radical vanes, housed in a suitable casing

Unit 3.5: Power Transmission system: Brakes and Gears

Unit Objectives

By the end of this unit, you will be able to:

1. Identify different types of breaks and gears

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, pointer, Internet connection (optional).

Explain

Use the presentation slides and explain the details of different types of brakes and gears.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Brake is a mechanical device that controls the motion of a vehicle.

B. Match the Columns

1. c. Consist of shoes or blocks which are pressed against the rotating surface of the brake drum
2. a. Design depends on force, torque, coefficient of friction and the radius of the rotating drum
3. b. Flexible bands wrapped partly around the drum

C. Match the Columns

1. b. Spur gear
2. c. Helical gear
3. d. Bevel gear
4. a. Planetary gear

Unit 3.6: Power Transmission System: Transmission Types

Unit Objectives

By the end of this unit, you will be able to:

1. Identify different types of transmission systems

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, pointer, Internet connection (optional).

Explain

Use the presentation slides and explain the details of different types of transmission types, transmission systems, differential, speed division by the differential, design of bevel gears of differential.

Notes for Facilitation

- Show them a video using the link, <https://www.youtube.com/watch?v=lq0jaMOFYnc> and discuss the video.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Manual and automatic

B. Match the Columns

1. c. Simple arrangement of spur gears and shaft
2. a. Simple arrangement of spur gears and shaft
3. d. Helical in shape
4. b. Power transmission using oil

C. Multiple Choice Questions

1. a. Taking smooth turns
2. d. Four bevel gears

Unit 3.7: Power Transmission System: Suspension System

Unit Objectives

By the end of this unit, you will be able to:

1. Identify different types of suspension systems

Resources to be Used

Presentation slides, Whiteboard, Markers, Projector, Laptop, Paper and pen, pointer, Internet connection (optional).

Explain

Use the presentation slides and explain the details of different types of suspension system, objective of suspension system, handling, suspension characteristics of tyres, types of suspension systems.

Demonstrate

- Take the participants to a lab/demonstration area to show how to check:
 - Check clutch, gears, brakes, steering and suspension systems for correct functioning
 - Examine for any leakage in the engine, transmission, hydraulic and steering
- Tell participants how to identify issues with the above components and the next steps to fix the identified issues.
- Estimated time for demonstration is 6 hours.

Field Visit

Purpose: To help participants identify different types of clutch, brakes and gears, transmission systems, suspension systems.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to identify different types of clutch, brakes and gears, transmission systems, suspension systems.

- Arrange a visit to the nearby tractor part suppliers.
- Divide the batch into 4 groups.
- Ask each group to investigate the details of one tractor component. For example, Group 1 will go to the supplier and find out the following details:
 - Function of a clutch

- Requirements of a clutch
 - Different types of clutches
 - Pricing of clutches
 - Advantages and disadvantages of each type of clutch
 - Working of each type of clutch
- Ask Group 2 to do a clutch like research on brakes and gears
- Ask Group 3 to do a clutch like research on transmission systems
- Ask Group 4 to do a clutch like research on suspension systems
- After participants return to the class, they will share their experience and the information with the class.

Field Visit

Purpose: To help participants identify different types of clutch, brakes and gears, transmission systems, suspension systems.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to identify different types of clutch, brakes and gears, transmission systems, suspension systems.

- Arrange a visit to the nearby tractor workshop.
- Divide the batch into 4 groups.
- Ask each group to investigate the details of one tractor component. For example, Group 1 will go to the workshop and find out the working of a clutch
- Ask Group 2 to do a clutch like research on brakes and gears
- Ask Group 3 to do a clutch like research on transmission systems
- Ask Group 4 to do a clutch like research on suspension systems
- Ask participants to observe an already trained service mechanic to see how they:
 - Identify clutch related issues
 - Fix the clutch issues
- Participants should practice looking for issues of the assigned component themselves, if possible.
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Show them a video using the link, <https://www.youtube.com/watch?v=APJ9bctVt38> and discuss the video.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Ride comfort and handling
2. Root Mean Square (RMS) method

B. Match the Columns

1. b. Introduced first to provide ride comfort to the operator
2. d. Introduced to isolate the operator from external distractions
3. e. Introduced to control the dynamic behaviour of the tractor
4. c. Introduced to improve traction performance of a tractor
5. a. Introduced to bring high travel speed

Unit 3.8: Removing Air from a Diesel Fuel System

Unit Objectives

By the end of this unit, you will be able to:

1. Describe the process of checking for bleeding or airlocks in the fuel system

Resources to be Used

Presentation slides, Whiteboard, Markers, Projector, Laptop, Paper and pen, pointer, Internet connection (optional).

Explain

Use the presentation slides to list the details of removing air from a diesel fuel system.

Demonstrate

- Take the participants to a lab/demonstration area to show how to:
 - Assess if there is air in the diesel fuel system
 - Identify the reasons for the air in the system
 - Remove it from the system
 - Prevent air does not get into the fuel system in the first place
- Allow participants to practice the steps demonstrated.
- Estimated time for demonstration is 3.5 hours.

Activity

Purpose: To help participants learn how to optimise resources at the workshop.

Resources: Pen and paper.

Methodology: Guest lecture and demonstration.

Tentative duration: 4 hours.

Expected outcome: Participants will be able to optimise the resources at the workshop.

- Arrange for a guest lecture to demonstrate the best practices to optimise the resources at the workshop.
- The guest lecture should include how to:
 - Optimise usage of various material in different tasks/activities/processes
 - Optimise usage of electricity/energy in various tasks/activities/processes
 - Connect electrical tools and equipment safely and turn off when not in use
 - Segregate waste into different categories
 - Dispose non-recyclable waste appropriately
 - Deposit recyclable and reusable material at the identified location
- Ask a few participants to volunteer and demonstrate the steps taught.

4. Repair and Maintenance of the Engine Parts

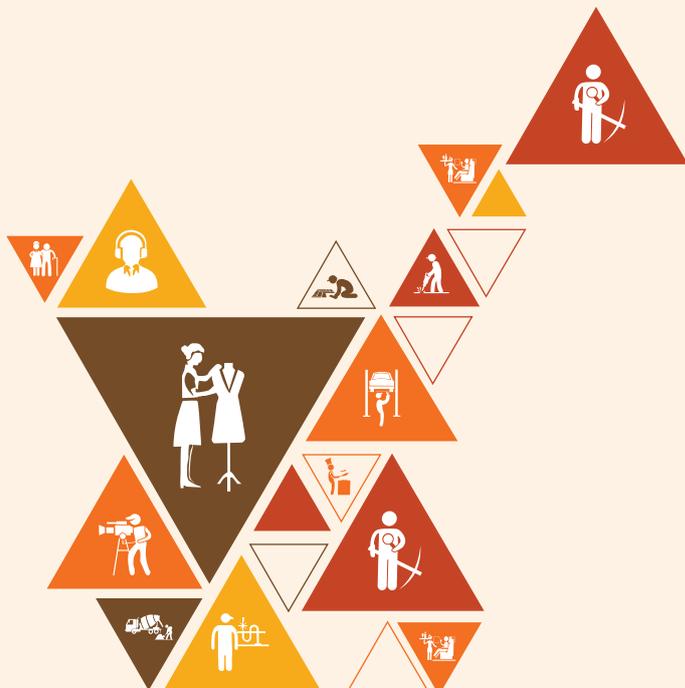
Unit 4.1 – Tractor Maintenance and Safety Precautions

Unit 4.2 – Internal Combustion (I.C) Engines

Unit 4.3 – Critical Settings of I.C Engines

Unit 4.4 – Preventive Maintenance of Tractor Parts

Unit 4.5 – Dismantling and Re-assembling Various Tractor Parts



Terminal Outcomes

After the completion of this module, participant will be able to:

1. Describe the process of identifying malfunctions, wear and tear or damage in various tractor engine parts
2. Demonstrate the process of carrying out repair and maintenance of various tractor engine parts
3. Demonstrate the process of identifying and rectifying various issues in a diesel engine with the common rail fuel system

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain various safety precautions to be undertaken during tractor repair and maintenance activities 2. Explain the design and working principle of various tractor engine parts 3. Describe the process of dismantling and re-assembling various tractor engine parts 4. Identify various critical settings such as valve clearance, timing gears and Fuel Injection Pump (FIP) timing, etc. 5. Describe the repair and maintenance procedure for different components of a tractor engine 6. Describe the procedure for the repair and maintenance a diesel engine with the common rail fuel system 7. Explain the importance of maintaining the record of repair and maintenance activities 	<ol style="list-style-type: none"> 1. Identify the type of given tractor engine, its components and working mechanism. 2. Demonstrate the use of relevant tools, equipment and PPE for dismantling the tractor engine parts 3. Analyse the dismantled parts for any malfunctions, wear and tear or damage such as the water temperature gauge, sensors, thermostat, valves, crankshaft/ bearings, oil rings, etc. 4. Demonstrate the process of carrying out repair, maintenance and replacement of various engine parts 5. Demonstrate the process of carrying out repair and maintenance of a diesel engine with the common rail fuel system

Unit 4.1: Tractor Maintenance and Safety Precautions

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the importance of maintaining the record of repair and maintenance activities
2. Explain various safety precautions to be undertaken during tractor repair and maintenance activities
3. Demonstrate the use of relevant tools, equipment and PPE for dismantling the tractor engine parts

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (If possible).

Do

Start with a recap of repair and maintenance records and advantages of maintaining log.

Ask

- Ask the participants about the various safety measures to be undertaken during repair and maintenance of vehicles?
- Collect all responses and build on it to bring the tractor safety guidelines.

Explain

Show presentation slides and explain tractor safety guidelines.

Demonstrate

- Arrange a demonstration for wearing the PPE kit and discuss the safety precautions to be undertaken during tractor repair and maintenance activities.
- Ask the participants to explain the steps in doing the same.
- Estimated time for the demonstration is 0.5 hour.

Notes for Facilitation

- Show the participants this video “<https://www.youtube.com/watch?v=Ql6mOu9OB3k>” and then explain about the personal and occupational safety precautions. This activity will take for about 30 minutes.
- Help the participants to complete all the exercises mentioned in the participant handbook.
- Encourage participants of group discussion to ask questions so that they can clear their doubts (if any).
- Encourage participants to undergo field visits and how they can learn more through these visits.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Advantages
 - Prevents expensive repairs
 - Increases safety
 - Helps timely replacement
 - Reduces labour workload
 - Helps manage each machine
2. PPE items:
 - Hearing protection
 - Helmet
 - Goggles
 - Safety shoes
 - Gloves
 - Mask

B. Fill in the Blank

1. Personal Protection Equipment

Unit 4.2: Internal Combustion (I.C) Engines

Unit Objectives

After the completion of this unit, the participants will be able to:

1. Explain the design and working principle of various tractor engine parts
2. Identify the type of given tractor engine, its components and working mechanism

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (If possible).

Do

Start with a leading question of your choice that intends to establish the need to study this unit.

Ask

What do you think is the role of an engine in a vehicle?

Explain

- Show the presentation slides and explain I.C Engines and its advantages in detail.

Ask

- Ask the participants about the different components of I.C Engines?
- Collect all responses and build on the different components of I.C Engines.

Explain

- Show the presentation slides and different components of I.C engines and its advantages in detail.

Demonstrate

- Arrange a cut section of an old tractor engine and show the various components along with its function and material in which it is made.
- Ask questions to check their understanding of the demonstration.
- Estimated time for the demonstration is 1.5 hours.

Say

- Explain that I.C. engines are also called automobile engines as they are widely used in automobile industries. An automobile engine may be classified in many manners according to:
 - Number of stroke
 - Design
 - Fuel
 - Method of ignition
 - Number of cylinder
 - Arrangement of cylinder
 - Air intake process

Explain

- Show the presentation slides and explain different types of engine types in detail.

Team Activity

Purpose: To acquaint the participants to learn about the basic engine terminology.

Resources/Tools: Projector, presentation slide, chits, jar, paper and pen.

Methodology: Collaboration.

Tentative duration: 0.5 hour.

Expected outcome: Participants will be able to explain about the engine terminologies

- Prepare small chits of paper. Some chits will contain the engine terminologies, while others will have their descriptions. Jumble up the chits and keep them in a bowl. Participants are to pick a chit from the bowl. Those with 'engine terminology' chits must pair up with their corresponding 'description chit counterparts. Allow 30 minutes for this activity.

Explain

- Show the presentation slides and explain engine terminologies.

Field Visit

Purpose: To identify the different types of I. C Engines.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 6 hours.

Expected outcome: Participants will be able to identify the different types of I. C Engines.

- Arrange a visit to a nearby dealer shop.
- Ask participants to gather information on:
 - Different types of engine types based on:

- Number of Stroke
 - Design
 - Fuel
 - Method of Ignition
 - Number of Cylinder
 - Arrangement of Cylinder
 - Air Intake and exhaust process
 - Lubrication system
 - Cooling system
 - Pricing of each engine type
 - Advantages and disadvantages of engine type
- After returning from the visit, participants will share their experience and the information with the class.

Field Visit

Purpose: To practice dismantling of an engine.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 6 hours.

Expected outcome: Participants will be practice dismantling of an engine.

- Arrange a visit to a nearby tractor workshop.
- Divide participants in to 4 groups.
- Give each group a different type of engine.
- Ask each group to:
 - Identify the type of engine
 - Components and working mechanism of given engine
 - Arrange the necessary tools and protective gear for dismantling the given engine
 - Dismantle the engine parts as per the instructions in the service manual
- After returning from the visit, participants will share their experience and the information with the class.

Notes for Facilitation

- Show them a video using the link, "<https://www.youtube.com/watch?v=vIJ50aUiBgM>" and emphasis on the working of an internal combustion engine.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. I.C engines are the engines in which combustion of fuel takes place within the engine. This combustion generates a high temperature and pressure that is exerted on the piston. Piston is a device fitted inside the cylinder of an engine which causes other parts of the engine to move up and down to transmit the pressure force to the crankshaft by a connecting rod. This pressure in turn rotates the wheels of a vehicle.
2. Advantages of I.C engines:
 - Have a higher efficiency than the E.C. engines
 - Are compact and require less space
 - Cost lower than the E.C. engines
 - Start easily in cold because they use high volatile fuel

B. Fill in the Blank

1. Top Dead Center
2. Bottom Dead Center
3. Internal Combustion

C. Match the Columns

1. f. Fuel intake, fuel compression and fuel burning takes place in this part
2. e. Sprays the fuel into combustion chamber at the end of compression stroke
3. b. Receives the efforts or thrust supplied by piston through the connecting rod
4. a. Used to ignite engine
5. c. Sprays the fuel into combustion chamber at the end of compression stroke
6. d. Used to control the inlet and exhaust of I.C. engines

D. Match the Columns

1. d. Has three cylinder banks connected to a common crankshaft
2. c. Engine with pistons positioned in a circular plane around the central crankshaft
3. b. Engine with two cylinder banks to a common crankshaft
4. a. Has three cylinder banks connected to a common crankshaft

Unit 4.3: Critical Settings of I.C Engines

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify various critical settings such as valve clearance, timing gears and Fuel Injection Pump (FIP) timing, etc
2. Analyse the dismantled parts for any malfunctions, wear and tear or damage such as the water temperature gauge, sensors, thermostat, valves, crankshaft/ bearings, oil rings, etc.

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (If possible).

Say

The I.C engines have various critical settings such as valve clearance, timing gears and Fuel Injection Pump (FIP) timing, etc. Let's look at the process of setting fuel injection timing in detail. FIP supplies fuels to the cylinders at the desired pressure and time which is very important. Majority of the tractors and diesel engines are equipped with in-line FIPs. The accurate FIP timing is set by fuel-cut-off method using swan neck pipe on Number 1 delivery valve holder after removing the delivery valve spring and peg.

Explain

Use the presentation slides to explain the process of setting FIP timing and FIP of rotatory pump in detail.

Demonstrate

- Take participants to the lab facility/work area and demonstrate the step-by-step process of setting of fuel injection timing and FIP of rotatory pump and inspect dismantled engine parts.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To practice setting the FIP of an inline pump and a rotatory pump.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to practice setting the FIP of an inline pump and a rotatory pump.

- Arrange a visit to a tractor workshop.
- Ask participants to observe and practice the process of setting FIP of an inline pump and a rotatory pump.
- After returning from the visit, participants will share their experience and the information with the class.

Field Visit

Purpose: To inspect dismantled engine parts.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to inspect dismantled engine parts.

- Arrange a visit to a tractor workshop.
- Give a dismantled engine to participants.
- Ask participants to the following tasks:
 - Clean the dismantled parts and accessories as per the Standard Operating Procedure (SOP)
 - Examine the dismantled parts for any damage
 - Check engine idle Revolutions Per Minute (RPM) and maximum idle RPM
 - Check the fuel system, lubrication system, cooling system, air intake and exhaust system for correct functioning
 - Inspect cylinder head to identify the need to replace it
 - Check the water temperature gauge, sensors, and thermostat for correct functioning
 - Inspect the engine front cover, front oil seal and rear oil seal to identify any replacement needs
 - Assess the taperness and ovality of cylinder bore
 - Examine engine compression pressure, turbo charger, and exhaust gas recirculation systems
 - Check the ovality of crank shaft/bearings for the prescribed measurement
 - Measure the piston rings' side clearance and butt clearance for the prescribed measurement
 - Examine valves for spring stiffness and clearance adjustment
 - Check for clearance between the gear and oil pump body
- After returning from the visit, participants will share their experience and the information with the class.

Notes for Facilitation

- Show them a video using the link, "<https://www.youtube.com/watch?v=IWocP-N1DLU>" and emphasis on the fuel timing setting – split cut-off method.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. General precautions:
 - Ensure setting the speed, only on a warmed up engine
 - Slacken the throttle link before setting the speed
2. FIP supplies fuels to the cylinders at the desired pressure and time which is very important. Majority of the tractors and diesel engines are equipped with in-line FIPs. The accurate FIP timing is set by fuel-cut-off method using swan neck pipe on Number 1 delivery valve holder after removing the delivery valve spring and peg.

B. Fill in the Blank

1. Fuel Injection Pump

Unit 4.4: Preventive Maintenance of Tractor Parts

Unit Objectives

After the completion of this unit, you will be able to:

1. Describe the repair and maintenance procedure for different components of a tractor engine
2. Describe the procedure for the repair and maintenance a diesel engine with the common rail fuel system
3. Demonstrate the process of carrying out repair, maintenance and replacement of various engine parts
4. Demonstrate the process of carrying out repair and maintenance of a diesel engine with the common rail fuel system

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (If possible).

Do

Recap by asking participants about the importance of maintaining a tractor in a good working condition.

Say

All vehicles need preventive maintenance for optimum and reliable performance. Tractors are no exception. A long list of issues can sideline your tractor at the most unexpected time. Therefore, as a tractor mechanic, you must always make the necessary repairs or replacements periodically. So, you need to stock up the parts listed in your operator's manual for the backup in case something goes wrong.

Explain

Use the presentation slides to explain the replacement parts for routine tractor repair.

Say

Tractor maintenance should be done every two months or 200 hours of work time. To increase the lifespan of your engine, you need to keep a few things in mind. Here is the list of focus areas for the tractor maintenance.

Explain

Use the presentation slides to explain the focus areas for the tractor maintenance.

Say

- Modern common rail injectors can perform multiple injections during a single combustion cycle and inject fuel into the engine at much higher pressures—up to 30,000 psi—through clearances as small as 1 micron. While modern injectors bring lower emissions, improve fuel economy and better the drivability, they are more susceptible to wear and tear.
- A faulty fuel injector disrupts or prevents the fuel spray into the combustion chamber.
- Let's look at the common causes of injector failure, its symptoms are and diagnosis for the best possible injector service.

Explain

Use the presentation slides to explain the common causes of injector failures, its symptoms, diagnosis and steps to replace the faulty common rail injectors.

Demonstrate

- Take participants to the lab facility/work area and demonstrate the step-by-step process of diagnosing and replacing a faulty injector.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hour.

Field Visit

Purpose: To perform the diagnosis and replacement of a faulty rail injector.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours

Expected outcome: Participants will be able to perform the diagnosis and replacement of a faulty rail injector.

- Arrange a visit to a tractor workshop.
- Ask participants to observe the procedure to diagnose and replace the faulty injector.
- Ask participants to practice the following points:
 - Examine tools required for the removal of injectors
 - Remove the engine head and check the intake valve and exhaust valve condition to ensure there is no leakage
 - Conduct the compression test as per the SOP
 - Check the piston ring and oil rings for any wear and tear or damage
 - Check the oil rings wear and tear or damage
 - Match crank shaft and balance shaft as per the design
 - Fit the rocker arm as per the service manual
 - Assemble the engine after repair and maintenance
 - Complete the repair and maintenance of a diesel engine with the common rail fuel system

- Examine the procedure to find torque, back-up torque, power and its units and working of a four-stroke diesel engine
 - After returning from the visit, participants will share their experience and the information with the class.

Notes for Facilitation



- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Replacement parts:
 - Filters
 - Oil and fuel
 - Coolants
 - Light bulbs
 - Belts
 - Zerk fittings
 - Fuses
2. Tractor maintenance should be done every two months or 200 hours of work time.
3. To increase the lifespan of your engine:
 - Clean air filters regularly
 - Repair/replace faulty spark plugs and ignition wire sets
 - Use the right oil and fuel
 - Maintain the adequate oil level
 - Repair/replace damaged belts and hoses
 - Store engine properly at a dry and secure place
 - Repair/replace damaged air intake system
 - Keep the tractor batteries charged
 - Clean the tractor after each use
4. Common reasons for rail injector failure:
 - Particle contamination
 - Water contamination
 - Deposit build-up around nozzle tips and injector's internal parts
 - Incorrect installation

B. Multiple Choice Questions

1. a. Disrupts fuel spray into the engine
2. c. Identify the fault code
3. d. 20,000 miles

Unit 4.5: Dismantling and Assembling Various Tractor Parts

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe the process of dismantling and re-assembling various tractor engine parts
2. Demonstrate the use of relevant tools, equipment and PPE for dismantling the tractor engine parts

Resources to be Used

Presentation slides, Whiteboard, Markers, Projectors, Laptop, Paper and pen, Pointer, Internet connection (If possible).

Explain

Show the presentation slide for the process of dismantling and re-assembling various tractor engine parts.

Demonstrate

- Take participants to the lab facility/work area and demonstrate the step-by-step process of dismantling and assembling various tractor engine parts such as single clutch, sliding mesh gear box, constant mesh gear box, synchromesh gear box.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hour.

Field Visit

Purpose: To perform the process of dismantling and assembling a single clutch, sliding mesh gear box, constant mesh gear box, synchromesh gear box, steering gear box, propeller shaft, differential, semi-floating rear axle, stub axle, suspension, brake system, leaf spring.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to perform the process of dismantling and assembling a single clutch, sliding mesh gear box, constant mesh gear box, synchromesh gear box, steering gear box, propeller shaft, differential, semi-floating rear axle, stub axle, suspension, brake system, leaf spring.

- Arrange a visit to a tractor workshop.
- Ask participants to dismantle, inspect and clean and assemble:
 - Single clutch
 - Sliding mesh gear box

- Constant mesh gear box
 - Synchromesh gear box
 - Steering gear box
 - Propeller shaft
 - Differential
 - Semi-floating rear axle
 - Stub axle
 - Suspension
 - Brake system
 - Leaf spring
- They should also perform the following tasks:
 - Refill distilled water in the battery to maintain the electrolyte level
 - Replace the oil filter, air filter, fuel filter, transmission filter, hydraulic filter and steering filter as per the Standard Operating Procedure (SOP)
 - Flush the radiator after opening it as per the service manual
 - Use the appropriate tools and equipment as per the service manual to carry out maintenance and repair activities of a broken-down engine
 - Replace any worn out or damaged engine parts with authentic new parts
 - Maintain the record of maintenance and repair activities
 - Use of measuring tools such as feeler gauge, fillet radius gauge, vernier, micrometre, dial gauge, dial bore gauge
 - Remove, flush and assembly of engine radiator
 - Inspect engine valves operating mechanism
 - Check air intake and exhaust system, fuel supply system, cooling system, lubrication system, governing system, etc.
- After returning from the visit, participants will share their experience and the information with the class.

5. Repair and Maintenance of the Transmission Hydraulic and Electrical Systems

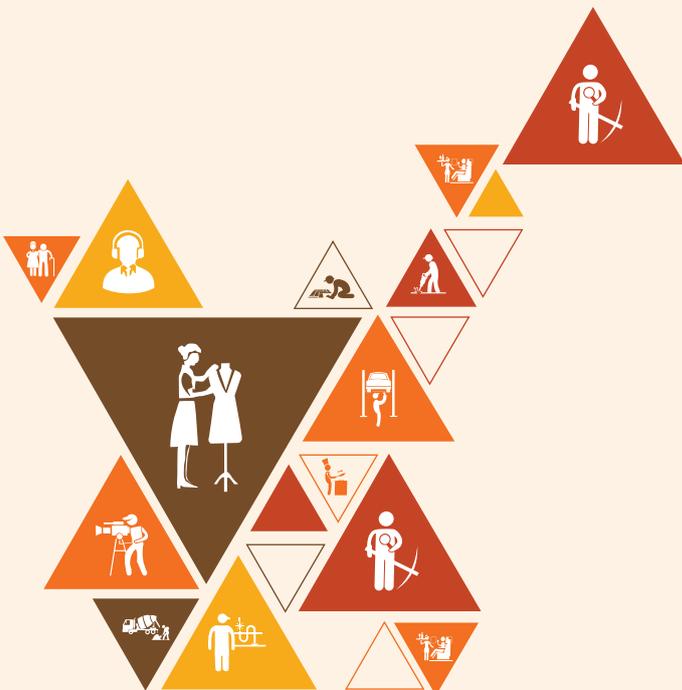
Unit 5.1 – Hydraulic System

Unit 5.2 – Differential Steering and Power Take-off System

Unit 5.3 – Repair and Maintenance of Transmission and Hydraulic System

Unit 5.4 – Brake

Unit 5.5 – Multi-meter and Hydrometer



Terminal Outcomes

After the completion of this module, participant will be able to:

1. Describe the process of identifying the repair and maintenance needs of a tractor's transmission, hydraulic and electrical systems
2. Demonstrate the process of carrying out repair and maintenance of the transmission, hydraulic and electrical systems

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain the types and functions of hydraulic, transmission and electrical systems of a tractor 2. Describe the sequence of checking a tractor's transmission, hydraulic and electrical systems 3. Identify different types of gear and power flow systems 4. Explain the functioning of differential steering and power-take-off systems 5. Identify different types of hydraulic pump, valve and cylinder 6. Explain the functioning of different types of brakes and their functions 7. Explain the working principle of the 3-point linkage system in a tractor 8. Explain Pascal's law of hydraulics 	<ol style="list-style-type: none"> 1. Demonstrate the process of disassembling and assembling the transmission, hydraulic and electrical systems in a tractor 2. Evaluate the performance of the transmission, hydraulic and electrical systems 3. Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage 4. Demonstrate the process of carrying out repair and maintenance of the transmission, hydraulic and electrical systems in a tractor 5. Demonstrate the use of relevant tools such as the multi meter and hydrometer

Unit 5.1: Hydraulic System

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the types and functions of hydraulic systems of a tractor
2. Explain Pascal's law of hydraulics
3. Demonstrate the process of disassembling and assembling the hydraulic systems in a tractor
4. Describe the sequence of checking a tractor's hydraulic systems. Explain the working principle of the 3- point linkage system in a tractor
5. Evaluate the performance of the hydraulic and systems. Identify different types of hydraulic pump, valve and cylinder
6. Analyse various components of the hydraulic systems such as the hydraulic distributor, pipes, cylinder for wear and tear or damage

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Bring an office chair in the class and adjust the chair in various ways. For example raise it, lower it, lean it backward and forward.

Ask

- How is it possible to adjust such a heavy office chair so easily with little effort? What principle do you think makes it happen?
- Collect all responses and bring them to explain the basic hydraulic principle.

Say

The working of hydraulic system is simple. Apply minimum pressure and generate greater force. Hydraulics system works is our life blood. You can see this playing out all around us like at the petrol pumps, airplanes, elevators, office chairs, barber chairs and all heavy machinery and equipment including tractors. A tractor's hydraulic system allows it to lift or lower heavy implements as needed and control implement depth during field operations with minimal effort. Fluid power is based on Pascal's law, which asserts that pressure applied to a fluid is equally transmitted in all directions. The assumption is that hydraulic fluid is incompressible. The force of output is controlled by fluid pressure. ($P = F/A = \text{force/area}$).

Explain

Show the presentation slides and explain the components of fluid power transmission, types of hydraulic systems.

Demonstrate

- Take the participants to a lab facility/work area and show them:
 - Different types of hydraulic pump, valves and cylinders.
 - Hydraulic control in a tractor—automatic hydraulic control, automatic position control system, automatic draft control system.
 - Way to adjust draft control and position control levers as per the requirement.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 3.5 hours.

Explain

Show the presentation slides and explain the hydraulic control in tractor.

Activity

Purpose: To help the participants understand Pascal's law.

Resources: Presentation slide, water filled balloons/water filled plastic balls, needles, pen and paper.

Methodology: Learning by doing.

Tentative duration: 0.5 hours.

Expected outcome: Participants will be able to understand Pascal's law.

- Give participants water filled balloons or water filled balls.
- Ask them all make a few holes in the given object and apply thumb pressure at any point on the object and record their observations.
- Ask volunteers to come forward and explain their observation.
- Build on the observation and explain the Pascal's law and its application using the presentation slides.

Explain

Show the presentation slides and explain the hydraulic system and its components in detail.

Demonstrate

- Take the participants to a lab facility/work area and show them the working principle of the 3-point linkage system in a tractor.

- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 4.5 hours.

Field Visit



Purpose: To inspect the correct functioning of various components of hydraulic systems.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to inspect the correct functioning of various components of hydraulic systems.

- Arrange a field visit to a tractor workshop.
- Ask participants to identify different components of hydraulic systems.
- Enquire about maintenance of hydraulic systems.
- Ask participants to examine:
 - Hydraulic pump for correct functioning.
 - Hydraulic distributor/control valve, hydraulic pipes and hydraulic cylinder components for any faults.
 - Quality of hydraulic oil and linkages.
 - Hydraulic system pressure and external hydraulics auxiliary valve for correct functioning.
 - Tractor's 3-point linkage for any wear and tear or damage.
 - Positioning of draft control and position control and adjust them as per the requirement, if required.
- After participants return to the class, they will share their experience and the information with the class.

Field Visit



Purpose: To practice dismantling and assembling hydraulic system as per service manual using appropriate tools and equipment.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to practice dismantling and assembling hydraulic system as per service manual using appropriate tools and equipment.

- Arrange a field visit to a tractor workshop.
- Ask participants to identify various tools and equipment used to dismantle hydraulic systems.
- After identifying the tools, ask participants to:

- Dismantle the parts of hydraulic systems.
 - Reassemble the parts of hydraulic systems.
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. The external static pressure applied on a confined liquid is distributed or transmitted evenly throughout the liquid in all directions.
2. Basic components of hydraulic system:
 - Hydraulic pump
 - Hydraulic cylinder and piston
 - Hydraulic tank
 - Control valve
 - Safety valve
 - Housing pipe and fitting
 - Lifting arms

B. Match the Columns

1. b. Maintains a constant flow of oil when not in use
2. a. Maintains a constant pressure when not in use
3. c. $(\text{pull} \times \text{hitch height}) / (\text{wheel base})$

C. Multiple Choice Questions

1. a. The hydraulic pump draws up oil from the oil reservoir and sends it to the control valve under high pressure

D. Fill in the Blanks

1. Feedback
2. Bigger, plunger, 150 to 200 kg/cm²

Unit 5.2: Differential Steering and Power Take-Off System

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the functioning of differential steering and power-take-off systems

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

Show the presentation slides and explain the various PTO systems.

Demonstrate

- Take the participants to a lab facility/work area and show them:
 - Working principle of differential and final drive.
 - Types and functioning of the differential and steering system.
 - Types and functioning of power take off systems.
 - Components and working of four-wheel drive of front axle.
 - Steering geometry, sequential dismantling of steering linkages, steering gear box, front axle hubs, pivot pins, re-assembling and critical settings.
 - Wheel toe-in setting.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 5 hours.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Types of steering system:
 - Front wheel steering
 - Rear wheel steering
 - All wheel steering
2. Effects of front wheel alignment:
 - Smooth steering
 - Directional stability
 - Minimal tyre wear

B. Match the Columns

1. a. $2-8^\circ$ negative
2. b. Less than 1°
3. c. Ranges from $4-8^\circ$
4. d. 2-4 mm

C. Fill in the Blanks

1. Relative strength, Powerful
2. Angular, Leverages

Unit 5.3: Repair and Maintenance of Hydraulic System

Unit Objectives

After the completion of this unit, participant will be able to:

1. Demonstrate the process of carrying out repair and maintenance of the transmission and hydraulic system

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To recall the maintenance and repair of the hydraulic systems.

Resources: Presentation slides.

Methodology: Quiz.

Tentative duration: 30 minutes.

Expected outcome: Participants will be able to recall the maintenance and repair of the hydraulic systems.

- Divide the batch into 4 groups.
- Ask each group to recall their experience at the workshop and create a presentation summarizing the process of maintenance and repair and dismantling and assembling hydraulics systems.
- Ask volunteers from each group to give their presentation and discuss the best practices for the managing hydraulics systems.

Explain

Show the presentation slides and explain the process of maintenance of hydraulic systems for recap.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Causes of aeration:
 - Low fluid levels
 - Air leaks in the suction seals
 - High viscosity due to cold fluid temperatures
 - Wrong fluid viscosity
 - Oxidised fluid that outlived its functional life
2. Common parts of hydraulic system
 - A reservoir or sump to supply fluid for the system, cooling and deairing of the return fluid
 - Pumps of various types to supply pressure for the system
 - Valves and servos to direct the fluid pressure and control the actuators
 - Pistons and actuators, the push and pull part of the system that makes things happen
3. Uses of hydraulic fluid
 - Transmits pressure and energy
 - Seals close tolerance parts against leakage
 - Minimises wear and friction
 - Remove heat and contaminates
 - Protects surfaces against rusting

B. Fill in the Blanks

1. 110°F to 140°F (43°C to 60°C)
2. Odour, Visual inspection
3. Pressurised, pressure

Unit 5.4: Brake

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the functioning of different types of brakes and their functions

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

Show the presentation slides and explain the concept of brake, hydraulic brakes and braking efficiency.

Demonstrate

- Take the participants to a lab facility/work area and show them the functioning and types of brakes such as dry disc brake and Oil Immersed Brake (OIB)
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To evaluate the components of transmission systems for correct functioning.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to evaluate the components of transmission systems for correct functioning.

- Arrange a field visit to a tractor workshop.
- Ask participants to:
 - Enquire about maintenance of transmission systems.
 - Check gearbox, rear axle, Power Take-Off (PTO) for the correct settings and performance.
 - Align the clutch using the appropriate tool.
 - Carry out maintenance and repair of gear and gearbox to resolve the issue of gearbox noise, oil leakage and slipping of gear.
 - Check for the recommended free play setting of the clutch and brakes.
 - Check the bull and pinion gear, epicyclic gear train and wheel assembly for correct performance.

- Examine the wheel hub bearing play to identify the need to replace the bearings.
 - Examine all nuts and bolts for the recommended torque and locking.
 - Check linkages in power-steering, steering pump, steering cylinders and the steering system.
 - Replace oil seals on axle shaft and bearings as per the requirement.
 - Examine the 2-wheel-drive front axle centre pin, stub axle and wheel assembly.
 - Examine the 4-wheel-drive front axle drop box, propeller shaft, differential, axle shaft and wheel assembly.
 - Adjust wheel tracking as per the requirement.
 - Adjust the steering geometry as per the requirement.
 - Inspect dry disc brake and Oil Immersed Brake (OIB) for correct functioning.
 - Replace the worn-out brake discs.
- After participants return to the class, they will share their experience and the information with the class.

Field Visit



Purpose: To practice dismantling and assembling of the transmission systems.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to practice dismantling and assembling of the transmission systems.

- Arrange a field visit to a tractor workshop.
- Ask participants to identify various tools and equipment used to dismantle transmission systems.
- After identifying the tools, ask participants to:
 - Dismantle the parts of transmission systems.
 - Reassemble the parts of transmission systems.
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation



- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Brake works on the principle of friction. When a moving element comes into contact with a stationary element, its motion is impacted. This is because frictional force operates in the opposite direction of motion, converting kinetic energy to heat energy.
2. Brake can be classified as:
 - Mechanical Brake
 - Hydraulic Brake
3. The hydraulic braking system operates on the basis of Pascal's law. The master cylinder is filled with brake fluid, which is often a glycerine and alcohol mixture. When the pedal is depressed, the piston of master cylinder is forced into the cylinder, and the entire system switches to a pressure system. The piston of the wheel cylinder immediately slides outward, causing the brake shoes to move and stop the rotating drum. When the pedal is released, the return spring of the master cylinder moves the piston back to its original position.

B. Match the Columns

1. a. Two brake shoes made of frictional material are mounted on the inside of the brake drum and are held apart by springs
2. b. This type of braking mechanism is typically found on crawler tractors
3. c. Steel balls are put in holes drilled in each of two actuating discs
4. d. It produces faster brake wear and increases the risk of losing control of the vehicle

Unit 5.5: Multi-meter and Hydrometer

Unit Objectives

After the completion of this unit, participant will be able to:

1. Demonstrate the use of relevant tools such as multi-meter and hydrometer

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To familiarise participants with the electrical systems of a tractor.

Resources: Presentation slide, Pen and paper.

Methodology: Guest lecture and demonstration.

Tentative duration: 4 hours.

Expected outcome: Participants will be able to understand the electrical systems of a tractor.

- Arrange for a guest lecture to talk about the:
 - Basic principles of electricity
 - Electrical systems of a tractor.
 - Components of electric system of a tractor.
 - Working of regulatory system, starting system and fuses/relays.
 - Trouble shooting issues with the electrical system of a tractor.
 - Maintenance and repair of electrical systems of a tractor.
- Ask participants to take notes from the lecture for further use or provide them with the print out of the lecture lesson.

Explain

Show the presentation slides and explain the concept of hydrometer and multi-meter.

Demonstrate

- Take the participants to a lab facility/work area and show them how to check:
 - Operate the hydrometer and multi-meter.
 - Check the cables for any wear and tear or damage.
 - Check Revolutions Per Minute (RPM) gauge, hour meter, fuel gauge, battery charging indicator for any faults.

- Test the performance of alternator, self-starter, starting system, relays, fuses, headlights, plough lamp, brake lights, indicator lights and horns
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 5 hours.

Field Visit

Purpose: To evaluate the correct functioning of a tractor's electrical systems.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to evaluate the correct functioning of a tractor's electrical systems.

- Arrange a field visit to a tractor workshop.
- Ask participants to identify various tools and equipment used to dismantle electrical systems.
- Enquire about maintenance of electrical systems.
- After identifying the various tools, ask participants to:
 - Operate hydrometer and multi-meter.
 - Check the cables for any wear and tear or damage.
 - Check Revolutions per Minute (RPM) gauge, hour meter, fuel gauge, battery charging indicator for any faults.
 - Test the performance of alternator, self-starter, starting system, relays, fuses, headlights, plough lamp, brake lights, indicator lights and horns.
- After participants return to the class, they will share their experience and the information with the class.

Field Visit

Purpose: To practice dismantling and assembling electrical systems as per service manual using appropriate tools and equipment.

Resources: Observations sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to practice dismantling and assembling electrical system as per service manual using appropriate tools and equipment.

- Arrange a field visit to a tractor workshop.
- Ask participants to identify various tools and equipment used to dismantle electrical systems.

- After identifying the tools, ask participants to:
 - Dismantle the parts of electrical systems.
 - Reassemble the parts of electrical systems.
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Difference between hydrometer and multi-meter
 - Hydrometer: A hydrometer is used to determine the status of charge of each cell in a battery. The hydrometer will determine the specific gravity of the electrolyte in the cell (its weight compared to water).
 - Multi-meter: It is a measuring instrument which enables us to observe and measure the invisible force of electricity as it interacts with the components in our engines and tractors. A digital multi-meter is used to measure current (amps), voltage (volts), and resistance (ohms).

B. Match the Columns

1. a. AC Voltage
2. b. AC Amps
3. c. Electrical pressure
4. d. Electrical friction that resists current
5. e. Electrical friction that resists current

C. Multiple Choice Question

1. c. Both a and b

6. Assembly of the Repaired and Serviced Engine Parts

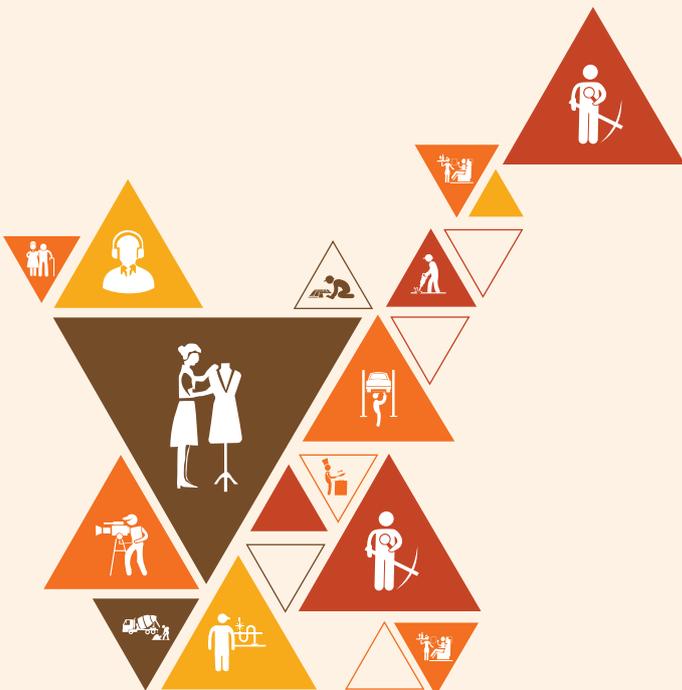
Unit 6.1 – Tractor Maintenance

Unit 6.2 – Bearing Lubrication

Unit 6.3 – Tyre Pressure Settings

Unit 6.4 – Tyre Track Adjustments

Unit 6.5 – Assembly of Tractor Engine Parts



AGR/N1130

Terminal Outcomes

After the completion of this module, participant will be able to:

1. Demonstrate the process of carrying out cleaning of the tractor engine parts and assembling them
2. Demonstrate the process of performing pre-start checks on the tractor

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Describe the process of assembling various tractor parts after carrying out repair and maintenance 2. Explain the process of cleaning various components of a tractor 3. Describe the process of performing pre-start checks 4. Explain the process of setting the draft control levers in the correct position 5. Explain the importance of maintaining the correct air pressure in the tyres for various operations 6. Describe the process of fitting the cage wheel and adjusting the track 	<ol style="list-style-type: none"> 1. Demonstrate the process of cleaning various tractor parts, shafts and bearings and applying lubricant 2. Demonstrate the process of assembling various tractor parts after carrying out repair and maintenance 3. Evaluate the tractor performance by performing the pre-start checks 4. Demonstrate the process of carrying out repair and maintenance for the common faults identified during the pre-start checks

Unit 6.1: Tractor Maintenance

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the process of performing pre-start checks
2. Evaluate the tractor performance by performing the pre-start checks
3. Demonstrate the process of carrying out repair and maintenance for the common faults identified during the pre-start checks
4. Explain the process of cleaning various components of a tractor

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projector, Laptop, Internet connection (If possible).

Do

- Ask participants if they remember the daily tractor inspection checklist that was covered in Module 3.
- Show the presentation slides and show the tractor pre-start checklist.

Activity

Purpose: To identify various tractor issues and record them in an audit tractor.

Resources: Presentation slides; Pen and paper.

Methodology: Learning by doing.

Tentative duration: 1 hour.

Expected outcome: Participants will be able to identify various tractor issues and record them in an audit tractor.

- Take the participants to a demonstration area/lab facility and ask participants to inspect a tractor and fill up the tractor given below:

Audit Tracker			
Look around and under the tractor for loose bolts, rubbish build up, oil, coolant leaks, broken and worn parts	Yes	No	N/A
Park on a flat surface, check engine oil before starting engine or 5 minutes after engine has stopped	Yes	No	N/A
Check if the coolant level is between the FULL and LOW marks of recovery tank. When coolant level drops due to evaporation, add water only up to the FULL level	Yes	No	N/A
Detach the screen and remove foreign matter/clean the screen	Yes	No	N/A
Check dust indicator on air cleaner body, if red signal visible, clean	Yes	No	N/A

immediately			
Inspect brake and clutch pedals for free travel and smooth operation	Yes	No	N/A
Inspect lights for broken bulbs or lenses	Yes	No	N/A
Check for worn or frayed belts, and that catches are clear of dust	Yes	No	N/A
Turn key to ON check fuel gauge; fill when tank shows 1/4 or less' refuel with diesels if required, when you start refuelling intermittent buzzer sounds, stop refuelling when buzzer goes continuous	Yes	No	N/A
Check that all labels are still visible	Yes	No	N/A
Tyre pressure FRONT 140 Kaplan (1.4kgf/cm ² , 20 psi) REAR (1.4kgf/cm ² , 20 psi); if utilizing front end loader, ensure front tyres are set to maximum inflation	Yes	No	N/A

- After returning to the class, discuss the importance of the maintaining a tracker.

Activity

Purpose: To create awareness about the tractor maintenance schedule.

Resources: Presentation slides; Pen and paper.

Methodology: Discussion.

Tentative duration: 30 minutes.

Expected outcome: Participants will be able to learn about the recommended tractor maintenance schedule.

- Divide the batch into 4 groups.
- Ask them to think about the frequency of tractor maintenance tasks and fill up the given table.
- After completion of the activity, call any group to present their thoughts.
- Finally, explain the importance of following a tractor maintenance schedule and show the recommendations for the tractor maintenance schedule from the presentation slides.

Frequency	Tasks
Daily inspections tasks	
Weekly inspection tasks	
Two-weekly tasks	
Monthly tasks	
Two monthly tasks	
Quarterly tasks	

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Pre-start checks:
 - Fluid levels
 - Tires and wheel
 - Batteries
 - Operator's platform area
 - SMV emblem
 - General checks
 - Oil pressure
 - Lights/flashers

B. Match the Columns

1. f. Daily task
2. e. Weekly task
3. d. Two weekly task
4. c. Monthly task
5. b. Two monthly task
6. a. Quarterly task

C. Multiple Choice Questions

1. d. 12 & 18 milli-meters
2. b. 15 mm

Unit 6.2: Bearing Lubrication

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Demonstrate the process of cleaning various tractor parts, shafts and bearings and applying lubricant

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

- What would happen if you walk on the marbles on the floor? Collect answers and ask the next question.
- Why do you slip when you step on the marbles?

Say

We will discuss this in a while. Let's do an activity first.

Practical Activity

Purpose: To create awareness about the importance of bearings.

Resources: Presentation slides; Marbles; Two steel plates (one smaller than the other); and observation sheet.

Methodology: Learning by doing.

Tentative duration: 15 minutes

Expected outcome: Participants will be able to learn about the importance of bearings.

- Divide the participants into groups of 4-5 depending on the batch size.
- Give each group a set of two steel plates and a few marbles.
- Ask each group to place the smaller plate within the bigger plate; try rotating the smaller plate by applying finger pressure and record their observations.
- Now, ask participants to place a few marbles between the plates; rotate the smaller plate and record the observations.
- Discuss observations.

Say

When we walk on marbles, they reduce friction between our feet and the floor due to which we slip. Similarly, when you tried to rotate the smaller plate without marbles by directly placing it on

another plate, the movement was difficult. It needed more effort. But, when you placed marbles between the plates and tried to rotate the plate, its movement was smoother comparatively. Why? Because the marbles reduced the friction between the two plates and made the movement easier. This is exactly what bearings do in machines, including tractors. Bearings reduce the friction between two moving parts of a machine and make the rotation or revolutions easier. Without bearings, nothing can move in a machine. But, just like any other part of a tractor needs maintenance, bearings too need care. They need to be lubricated regularly. Lubrication creates a thin film between the component and its contact areas to prevent sticking or rubbing. The role of bearing lubrication in tractor maintenance is significant.

Explain



Show presentation slide and explain the importance of bearing lubrication, types of bearings, factors affecting lubrication selection and the best practices for bearing lubrication.

Notes for Facilitation



- Show them the YouTube, "<https://youtu.be/FdGKbQHofM>" and discuss the video in the class.
- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Importance of bearing lubrication:
 - Ensures smooth and continued running of power transmission
 - Acts as a barrier between components within the bearing
 - Improves the longevity of bearings
 - Prevents oxidisation
 - Minimises corrosion
 - Acts as a contaminant barrier
 - Reduces component friction
 - Decreases usage wear
 - Stabilises the bearing structure
2. Factors affecting lubricant selection:
 - Importance of bearing lubrication:
 - Speed of the bearing and the friction maintenance
 - Condition of the mechanical operation
 - Viscosity of the lubricant under operational speeds and temperatures
 - Application of lubrication upon initial installation or maintenance through the operation

B. Match the Columns

1. c. Has low-rate maintenance schedule
2. a. Can take high load speeds and high load capacities
3. b. Are last resort selection for harsh conditions

C. Multiple Choice Questions

1. a. Oil
2. b. Oil

D. State Whether True or False (T/F)

1. True
2. False
3. False
4. False

Unit 6.3: Tyre Pressure Settings

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the importance of maintaining the correct air pressure in the tyres for various operations

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Team Activity

Purpose: To create awareness about the importance of the correct tyre pressure setting.

Resources: Presentation slides; Over-inflated tyre and under-inflated tyre.

Methodology: Discussion.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to learn the importance of the correct tyre pressure setting.

- Bring two tyres to the class; one over-inflated and another under-inflated.
- Show it to the participants and ask which tyre is over-inflated and which one is under-inflated.
- Collect responses and ask them to discuss the consequences of each.
- Collect their responses and explain the importance of correct tyre pressure by showing the presentation slides.

Explain

Show the presentation slides and explain the link between loadtyre pressure and conditions to exceed the load index in certain conditions.

Do

Ask the participants to through their participant handbook to study the load index table and corresponding in KG for a nominal Inflation pressure of 1.6 bar.

Explain

Show the presentation slides and explain the link between speed and tyre pressure and conditions to exceed the speed index in certain conditions.

Ask 

- Is there a way to avoid repetitive pressure adjustments for moving between the field and road?
- Collect all the responses and explain the concept of VF tyres using presentation slides.

Demonstrate 

- Take the participants to a lab facility/work area and show them the:
 - Load capacity indicator on tyres and explain its meaning
 - Difference between an over-inflated tyre and under-inflated tyre
 - Difference between a regular tractor tyre and a VF tyre.
- Estimated time duration for the demonstration is 1 hour.

Do 

Show them the YouTube, "<https://youtu.be/nvyN7O2lgGQ>" and discuss the video in the class.

Notes for Facilitation 

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Carrying out correct pressure setting is crucial to:
 - Double load
 - Preserve soil in the fields
 - Adjust the tractor's speed and load
2. Key elements:
 - Pressure
 - Speed
 - Load

B. Multiple Choice Questions

1. a. Deflection
2. c. Allows to carry more load
3. a. Limit to load capacity
4. b. Increase pressure by 0.20 bar and reduce load by 5%
5. b. Don't need pressure adjustments

A. Fill in the Blanks

1. Very improved flexion
2. European Tyre and Rim Technical Organisation

Unit 6.4: Tyre Track Adjustments

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe the process of fitting the cage wheel and adjusting the track

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Say

Just like it is important to have correct air pressure in tyres for the best performance of tractors; it is important to check their tyre alignment regularly. The front wheels are installed on the front axle at a certain angle in accordance with the front wheel alignment. All elements making up this angular relation should be correct. Only then, the front wheel alignment:

- Minimises steering wheel turning effort
- Stabilises the steering wheel
- Provides self-centring to the steering wheel
- Prolongs the life of tyres

Explain

Show the presentation slides to explain the front wheel alignment and front axle adjustments; explain the construction of front axle, wheel hub, steps to dismantle front axle and reassemble it, front wheel track adjustment and toe-in adjustment.

Do

- Ask the participants to study the tables for wheel weights from their participant handbook and discuss the topic in the class.
- Show them the YouTube link, <https://youtu.be/DNacW2IF6QM> and discuss the video.

Demonstrate

- Take the participants to a lab facility/work area and show them how to adjust:
 - Front wheel alignment
 - Front axle
 - Toe-in adjustments
- Estimated time duration for the demonstration is 2 hours.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Importance of correct wheel track adjustments:
 - Minimises steering wheel turning effort
 - Stabilises the steering wheel
 - Provides self-centring to the steering wheel
 - Prolongs the life of tyres
2. Constituents of front wheel adjustment:
 - Camber
 - Caster
 - King pin inclination
 - Toe-in

B. Fill in the Blanks

1. Numbers in image indicate:
 1. Hub of retaining washer
 2. Hub of retaining nut
 3. Outer bearing cone and roller
2. Numbers in image indicate:
 1. Dust seal
 2. Wheel spindle

Unit 6.5: Assembly of Tractor Engine Parts

Unit Objectives

After the completion of this unit, the participant will be able to:

1. Describe the process of assembling various tractor parts after carrying out repair and maintenance
2. Demonstrate the process of assembling various tractor parts after carrying out repair and maintenance

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

- Ask the participants if they remember the components of I.C engines discussed in Module 3 and the process of dismantling and reassembling engines from Module 4.
- Collect responses and recap the topic.

Field Visit

Purpose: To observe the types of bearing lubrications and their application process.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to observe the types of bearing lubrications and their application process.

- Arrange a field visit to a workshop/dealer.
- Divide the participants in groups of 4 to 5 depending on the batch size. Arrange for them to find out about different types of bearing lubricants and the process of applying each type of lubricant.
- While on the field visit, the participants should observe the following:
 - Is there any difference between regular lubricants and bearing lubricants?
 - Do bearings need a special lubricant type?
 - What are different types of bearing lubricants?
 - What are their advantages and disadvantages?
 - What factors affect the bearing lubricant selection?
 - What are the best practices for bearing lubrication?
 - How to apply lubricant on the parts/shafts and bearings?
 - How to clean the moving parts/shafts and bearings?
 - How to adjust the gearbox bearing?

- After they come back to class, participants will give a presentation on what they observed at the workshop.

Field Visit

Purpose: To observe the correlation between the speed, load and tyre pressure and learn how to adjust tyre pressure, front wheel, front axle and toe-in.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to observe the correlation between the load, speed and tyre pressure and how these can be adjusted.

- Arrange a field visit to a workshop/dealer/field.
- Divide the participants in two groups.
- Let one group enquire and see how load and tyre pressure are interlinked. They can get the load on an off to the overall impact of the adjustments on the soil. They can also observe how a particular setting may create a difference in operation on the field and on the road.
- Let another group enquire and see how speed and tyre pressure are interlinked. They can get increase and decrease the speed and observe the overall impact of the adjustments on the soil. They can also observe how a particular setting may create a difference in operation on the field and on the road.
- While on the field visit, the participants should observe the following:
 - What is the link between load, speed and tyre pressure?
 - What is the impact of various adjustments to the load and speed on the soil and on the road?
 - How to check the tyre pressure for suitability for various operations?
 - How to set draft control levers in the correct position?
 - How to adjust tyre pressure, front wheel, front axle and toe-in?
 - How to fit the cage wheel and adjust track?
- Let the participants watch the process and note down the steps. They can also try doing the task themselves.
- After they come back to class, participants will give a presentation to share their observations.

Terminal Outcomes

After the completion of this module, participant will be able to:

1. Apply techniques for effective communication with the stakeholders
2. Explain how to mentor an apprentice
3. Discuss ways to promote diversity and inclusion at the workplace

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain the importance of verbal and non-verbal communication at the workplace 2. Explain the effective methods of sharing and seeking information and feedback at the workplace 3. Explain the procedure for completing work-related documentation 4. Describe the process of mentoring an apprentice at the workplace 5. Explain the importance of inclusion of all genders and People with Disability (PwD) at the workplace 6. Explain gender concepts (gender as a social construct, gender sensitivity, gender equality etc.), issues and applicable legislation 7. Explain ways in which a conducive working environment can be created for all genders and PwD 8. Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD 9. Explain the applicable PwD related regulations 10. Explain the procedure to report inappropriate behaviour e.g., harassment 	<ol style="list-style-type: none"> 1. Demonstrate the requisite level of proficiency in verbal and non-verbal communication at the workplace 2. Demonstrate different approaches to mentoring an apprentice at the workplace 3. Prepare a sample training schedule for an apprentice 4. Demonstrate appropriate verbal and non-verbal communication that is respectful of genders and disability

Unit 7.1: Effective Communication Techniques

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the importance of verbal and non-verbal communication at the workplace
2. Explain the effective methods of sharing and seeking information and feedback at the workplace
3. Explain the procedure for completing work-related documentation
4. Define the need for appropriate verbal and non-verbal communication while interacting with all genders and Persons with Disability (PwD)
5. Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD
6. Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To recognise what is effective communicator.

Resources: Presentation slides, Tie, Candle, Match box, Water bottle, Cell phone.

Methodology: Discussion on a case scenario.

Tentative duration: 10 minutes.

Expected outcome: Participants recognise the importance of communication and what constitutes effective communication.

- Put up the presentation slide and start the game. Say that this is a game on giving instructions. Divide the class into 4 teams. Make the teams sit close to one another in 4 corners of the room. Give the following briefing to the class:
- Assume I have no intelligence. I shall assign one activity to each team.
- You should write instructions for me so that I can conduct that activity given to you as you read out the instructions.
- Instructions cannot be oral. They have to be written and then finally one of the team members will read it out for me as I perform it.
- You will be given ten minutes to write the instructions. The entire team should contribute in deciding the instructions. However, only one person writes it.
Remember that, since I do not have any intelligence, I will do exactly as instructed by you.
- Assign the following activities, one per team.
 - a. Drinking water from a bottle placed on the table
 - b. Lighting a candle with a match box both of which are placed on the table
 - c. Knotting a tie

- d. Making a phone call from the cell phone placed on the table.
- At the end of ten minutes, ask all participants to stop. Collect the sheets from the teams. Ask one representative from each team to read the instructions. Misinterpret most of the instructions such that the activity never gets done. Example: If one of the instructions for drinking water from the bottle says 'Pick up the bottle', then pick up the bottle up-side down. If the instruction for making a phone call is, 'Pick up the phone', then just pick it up. Do not speak or keep it near your ears unless mentioned. Repeat this for all four teams. Take 2 minutes to perform each activity the wrong way.

Explain



Explain the importance of communication and why it should be effective and what happens if it is not effective. Ask participants what they learnt from the game on the importance of communication skills.

Say



In any communication, there is a sender who sends a message. There may be one or more receivers to whom the message is meant. The sender uses a medium to send the message. The medium could be air, paper, phone etc. Once the receiver receives the message, the receiver sends a feedback/response or an acknowledgement.

Activity



Purpose: To recognise that communication is a two-way process.

Resources: Presentation slides, Books, Pens, Whiteboard.

Methodology: Game.

Tentative duration: 15 minutes.

- Show them the slide on the game, Walk the Talk. Choose one participant. Blindfold the participant and ask the participant to stay outside the class. Create a maze inside the class. The maze can be created in many ways.
 - If there is enough space, you may ask the rest of the class to join hands and form a maze in a shape of their choice.
 - You may arrange desks and benches to form the maze.
 - You may put down books, pens etc on the floor and form the path of the maze.
- Choose one of the participants to give instructions to the blind folded participant. Once the maze is ready, bring the blindfolded participant to the entrance of the class. From that point onwards the guiding participant guides the blindfolded participant. If the blindfolded participant collides or touches any part of the maze, then the team is disqualified and the game ends. If time permits, you may give the team another chance to try.
- Applaud for the effort of the pair. Do not explicitly mention to the team that the blindfolded participant may also seek clarifications from the guiding participant. However, if questioned regarding this, agree that the blindfolded participant may ask questions.

Explain

Based on the above activity, elicit from the participants the advantages and disadvantages of one-way communication. Discuss the responsibility of the sender as well as the receiver of information. Explain why two way communication is important to make the communication effective. Further discuss, what prevented effective communication during the game. In other words, why does communication fail.

Using the presentation slides, explain the channels of communication, namely verbal and non-verbal. Irrespective of the medium of communication, one must remember the tips for effective communication. Put up the slide and get Participants to read out the tips one by one. Let others respond with examples and explain the importance of each. Make this session as interactive as possible. Discuss the points under the heads – Listening, Speaking, Reading, Writing.

Activity

Purpose: To recognise the importance of listening skills.

Resources: Presentation slides.

Methodology: Game.

Tentative duration: 15 minutes.

Expected outcome: Participants recognise what constitutes active listening skills.

- Give the following instructions to participants.

Everybody stand up. There is a person called Simon sitting on the chair at the desk. You cannot see or hear Simon. So, Simon will communicate through me and whatever Simon asks me to tell you, I shall start the sentence with 'Simon says...'. If the sentence does not have the phrase 'Simon says', then it is an instruction from me and you should not follow it. For this game, you will follow exactly what Simon asks you to do. You will do it immediately without delay. For example, if I say "Simon says stand up", you should immediately stand up. If I say "Simon says sit down" you should immediately sit down. But if I simply say "Stand up" or "Sit down" then you should not follow it. Even if you show slight movement for my instructions, you are disqualified. Once disqualified, please move towards the wall and we shall continue the game with the rest of the participants. Also watch out for those who make mistakes. Let us see who wins the game in the end.

Say

What mistakes did you make during the game? Some reasons could be noise, poor concentration, stress and pressure to win, poor listening skills etc. The external barriers like noise is the same for all participants. Hence, for this game the most important reason why all of you except one lost is owing for failing was owing to your listening skills. For some, the listening skill failed them in the beginning itself. For others, it deteriorated with time.

Explain

- Explain what one must do to improve listening skills. Go on to explaining the difference between hearing and listening and its importance.

- Proceed to speak about non-verbal communication. Put up the slide. Discuss what the series of expressions / body language communicate. Discuss the impact of negative non-verbal cues on work and work environment.
- Proceed to the next topic on communicating with people with disabilities. Conduct a brief discussion on how one must communicate with those with disabilities. Write them on the board. Post this, put up the slide.
- Put up the slide on giving constructive feedback at the workplace. Explain the importance of giving and receiving feedback.

Activity



Purpose: To provide constructive feedback at workplace.

Resources: Presentation slides.

Methodology: Role play.

Tentative duration: 15 minutes.

Expected outcome: Participants learn to use the right choice of words, tone of language to be used while giving and receiving feedback at workplace.

- Provide the following situations. Call for volunteers to enact the situation.

Situation 1: You are not happy with your subordinate's quality of work. You have to communicate this to your subordinate.

Situation 2: Your work completion deadline is dependent on your team member's contribution. You find your team member slow and taking it easy. You have to give your fellow team member this feedback.

Situation 3: You feel that the time deadline given to you for a certain project is unreasonable. You feel the project should not have been taken up from the client under the given terms. You have to communicate this to your boss.

Explain



- Put up the slide and summarise the key points to keep in mind while giving and receiving feedback. Speak about PNP technique, which is Positive-Negative-Positive technique. Begin with a positive note, followed by the constructive feedback and end again by citing a positive aspect.
- Post this, proceed to speak about the various documentation to be maintained related to work. Using the slides, explain the importance of maintaining records and documents, the process, the owners, the steps in creating a process document and the best practices for preparing documents.

Notes for Facilitation



- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Multiple Choice Questions

1. a,b,c
2. a
3. a

B. Tick the Correct Options

ii, iii, iv

Unit 7.2: Mentoring Apprentices

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the process of mentoring an apprentice at the workplace
2. Demonstrate different approaches to mentoring an apprentice at the workplace
3. Prepare a sample training schedule for an apprentice

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

Begin with a brief background on On Job Trainings (OJT) and apprenticeships that are an integral part of any vocational skills training programme. Introduce the terms Mentor, Mentee (Apprentice). Prepare the class for a panel discussion as mentioned below.

Activity

Purpose: To recognise the importance of mentoring an apprentice.

Resources: Presentation slides.

Methodology: Panel discussion.

Tentative duration: 30 minutes.

Expected outcome: Participants discuss what is mentoring and its benefits for mentor, mentee and the organisation.

- Call for four participants. They will play the following roles:
 1. Mentor
 2. Apprentice
 3. HR of the organisation
 4. Moderator
- Conduct a Panel Discussion. The topics for the discussion for each of the roles is as follows:

Panelist	Moderator	Mentor	Apprentice	HR person
Topic for discussion	Opening remarks: Mentoring; Need for mentoring	Benefits of mentoring from view point of a Mentor	Benefits of mentoring from view point of Mentee (Apprentice)	Benefits for the organisation

- The Moderator must open the discussion with opening remarks on what is mentoring and its need. He/she then hands over the floor to each panelist one by one who speaks on the topics allotted to them. Post that, the floor is open for discussion where all Panelists will participate moderated by the Moderator. The Moderator must intervene at

appropriate points to ensure the discussion does not digress from the topic allotted. Finally, the Moderator sums up the key takeaways from each topic allotted to each Panelist.

Explain



- At the end of the discussion, put up the slide and summarise the benefits of mentoring. Put up the slide on mentoring responsibilities emphasising on the importance of safety, knowledge, positive attitude and behaviour to be maintained by Mentor, Mentee and Employer during the course of mentoring.
- Proceed to explain the different mentoring models, using the slides.

Role Play



Purpose: To apply the steps in mentoring to a real life situation.

Resources: Old engine, necessary tools.

Methodology: Role play.

Tentative duration: 30 minutes.

Expected outcome: Demonstrate the steps in mentoring and those in being mentored, through a live scenario.

- The task in hand is to mentor an apprentice on dismantling an engine. Call for two participants. One person acts as the Mentor and the other, as the Apprentice. The Mentor provides the Apprentice with the necessary tools, equipment, engine and has to guide the Apprentice step by step. At the end of the Role Play, participants are to provide constructive feedback. Other participants are to observe and evaluate the performance of the Mentor on the following parameters:
 - Building rapport with Apprentice
 - Identifying skill needs /gaps in Apprentice
 - Demonstrating the task
 - Summarising the task
 - Asking Apprentice to perform the task
 - Giving constructive feedback

Explain



Put up the slide on step by step procedure in the mentoring process. As you explain the steps, relate them to the Role Play scenario. Analyse the Role Play that was performed with respect to the steps on the slide.

Notes for Facilitation



- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

Prashant (Mentor)	Prince (Mentee)
Provides opportunity to share industry best practices	Fast tracks learning curve Improves productivity
Builds a productive and supportive team environment	Develops new skills

Unit 7.3: Gender Inclusivity at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain gender concepts (gender as a social construct, gender sensitivity, gender equality etc.), issues and applicable legislation
2. Explain the importance of inclusion of all genders and persons with disability at workplace
3. Define the need for appropriate verbal and non-verbal communication while interacting with all genders and persons with disability
4. Explain ways in which a conducive and inclusive working environment can be created for all genders and persons with disability

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

Introduce and explain the various gender concepts such as – Gender, Sex, Gender stereotyping, Gender discrimination, Gender equality, Gender awareness by giving examples.

Activity

Purpose: To determine what is a “man's” work and “woman's” work.

Resources: Presentation slides.

Methodology: Discussion.

Tentative duration: 15 minutes.

Expected outcome: Identify traditional roles and occupations assigned to men/women/other genders.

- Put up the slide which lists the various occupations, jobs, tasks. Ask participants whom they associate with each of the occupations, jobs, tasks – men or women. They must give the reason.

Explain

- Participants are made to realise that certain roles/jobs are typecasted to certain genders and the trend must change. Explain that persons of all genders are equal. Proceed to discuss about persons with disabilities and the different types of disabilities.
- Conduct a brain storming session on the various challenges faced by PwD at workplace using the cue points on the slide. Using the slide, explain the various ways in which one must communicate with PwD at workplace.

Elaborate

- Using the slide, elaborate on inclusive behaviour and its benefits. Speak about the benefits of inclusive behaviour at workplace. Proceed to discuss the manner in which communication must be conducted with women. The choice of words to use, body language, etiquette to follow while interacting with women a workplace. Educate participants on what constitutes sexual harassment and the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act that exists for lodging complaints, inquiry and action to be taken.
- Put up the slide on how to create an inclusive work environment and conclude.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Respectful, courteous behaviour/speech with people of all genders and persons with disabilities
2. Improves staff retention due to better culture, treats everyone with respect, dignity, fairness
3. Unfriendly infrastructure, stigma at workplace. Conduct awareness and training programmes, practicing gender sensitive speech and behaviour

B. Match the Columns

1. c. gender
2. a. Sex
3. d. Gender stereotyping
4. b. Gender discrimination
5. g. Gender equality
6. e. Gender awareness
7. f. Persons with disability or PwD

Terminal Outcomes

After the completion of this module, participant will be able to:

1. Discuss how to adhere to personal hygiene practices
2. Demonstrate ways to ensure cleanliness around the workplace

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain the requirements of personal health, hygiene and fitness at work 2. Describe common health-related guidelines laid down by the organizations/ Government at the workplace 3. Explain the importance of good housekeeping at the workplace 4. Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases 	<ol style="list-style-type: none"> 1. Demonstrate personal hygiene practices to be followed at the workplace 2. Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs 3. Demonstrate the steps to follow to put on and take off a mask safely 4. Show how to sanitize and disinfect one's work area regularly 5. Demonstrate adherence to the workplace sanitization norms 6. Show how to ensure cleanliness of the work area

Unit 8.1: Personal Health, Hygiene and Fitness at Work

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the requirements of personal health, hygiene and fitness at work
2. Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs
3. Demonstrate how to wash worn out clothes with soap and sun-dry before use next time
4. Demonstrate the steps to follow to put on and take off a mask safely

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To understand the need for personal hygiene.

Resources: Presentation slides.

Methodology: Discussion.

Tentative duration: 15 minutes.

Expected outcome: Participants are to list the external parts of the body that need to be kept clean and healthy, while explaining why it is needed.

- Put up the presentation slide and start a discussion around the subject—what is personal hygiene and why it is needed.

Explain

- Using the slide, explain the points that came up during the discussion and sum up as follows:
 - What is personal hygiene?
 - Why it is important?
 - The external parts of the body that are prone to dust, dirt, oil, food particles, heat, cold, body odour.
- Further, using the slides, explain how to maintain personal hygiene at work place as well as otherwise. Then proceed to explain how germs spread from our hands to the various parts of the external body before eventually entering the body. It is, therefore, important to wash our hands often. Using the slide, speak about the instances when we must wash our hands. With this background, start an activity on washing of hands.

Activity

Purpose: To wash hands correctly.

Resources: Running water, soap.

Methodology: Learning by doing.

Tentative duration: 10 minutes.

Expected outcome: Participants learn the correct procedure to be adopted while washing hands.

- Call for volunteers to demonstrate washing of hands. Others are to observe and give feedback about the procedure.

Explain

- Explain that washing is incomplete if we have not washed up to the wrists. Washing with soap and water is the best way to get rid of germs. But if soap and water are not available, we can use an alcohol-based hand sanitizer that contains at least 60% alcohol. Sanitizers can reduce the germs on hands. But they may not be very effective in removing harmful chemicals, pesticides from hands.
- Next, go on to explain that one of the important aspects of maintaining personal hygiene and good health is to wear clothing that are washed well and sun dried. Put up the slide on the steps to wash and sun-dry soiled clothing. Call for volunteers to read out from the slide and explain. Explain the benefits of soaking clothes in hot water with detergent before washing them.
- Put up the slide on wearing and removing masks. Ask participants to share experiences on how to wear and remove a mask correctly.

Activity

Purpose: To follow the correct way to:

- Wash hands,
- Wash and dry worn out clothes,
- Wear and take off mask safely.

Resources: Running water, soap and hand rubs, PPE.

Methodology: Learning by doing.

Tentative duration: 15 minutes.

Expected outcome: Participants learn the correct procedure to be adopted while washing hands, wash and dry clothes, wearing and taking off mask safely.

- Conduct the practical on the following:
 - Correct way of washing hands using soap and water, and alcohol-based hand rubs
 - How to wash worn out clothes with soap and sun-dry before use next time
 - Steps to follow to put on and take off a mask safely
 - Provide the necessary tools, materials needed for participants to perform the practical.
- Evaluate the performance of each participant w.e.t the parameters of each task, if performed fully, accurately and within the time limit specified.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. To be free of diseases, illnesses and to be able to work productively
2. After returning from the toilet, before and after meals, after returning home from outside, after touching garbage, animals, petspalms of both hands, back side of both hands, finger nails, hands up to the wrist

B. Multiple Choice Questions

ii, iii, iv

Unit 8.2: Cleanliness and Safety at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe common health-related guidelines laid down by the organisations/Government at the workplace
2. State the importance of sanitizing the workplace
3. Show how to sanitize and disinfect one's work area regularly while adhering to workplace sanitization norms

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Explain

- Explain that safe and healthy working environment is a fundamental right of every citizen. Organisations and the government recognising the need to develop a safety and health culture, have developed a framework and guidelines to reduce incidence of work related injuries, fatalities, diseases, building awareness on safety and health at workplace. To achieve this, both the employer and employee at workplace have certain duties to comply with.
- Using the slide, discuss the duties of employers and employees in providing/maintaining a safe and clean work environment at work place.

Activity

Purpose: To explain the importance of sanitizing the workplace and how to go about the same.

Resources: Presentation slides.

Methodology: Discussion.

Tentative duration: 15 minutes.

Expected outcome: State the importance of sanitizing the workplace and explaining how to sanitize and disinfect one's work area as per workplace sanitization norms.

- Show the slide which has cue points. Participants are to explain how to sanitize the various areas/parts of the work area.

Explain

- Conclude the activity with an explanation on the need to sanitize the workplace and the procedure for the same. Using the slide, emphasise on the various tools needed for sanitization, the various surfaces, and areas of the work place that need to be sanitized. Focus on these points:
 - Cleaning from cleanest to dirtiest

- Use of disinfectants, sanitizers
- Creating awareness on cleanliness

Activity

Purpose: To follow the correct way to sanitize and disinfect work area.

Resources: Cleaning agents, disinfectants and sanitizers, tools and equipment for cleaning, necessary PPE.

Methodology: Learning by doing.

Tentative duration: 30 minutes.

Expected outcome: Participants learn the correct procedure to be adopted for cleaning, sanitizing and disinfecting the work area with the required tools and equipment.

- Participants are to perform the practical on sanitizing and disinfecting the work area. The necessary cleaning materials, tools are to be provided. The procedure as listed in the slides and Participant Handbook are to be followed and participants are to be evaluated accordingly.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. My duty - Take care of my own health; Report to Supervisor of any symptoms of illness, contagious diseases.
2. Employer's duty - Provide a workplace that is free from hazards that may cause injury or diseases, clean drinking water, toilets; impart training to staff on safety protocols
3. To prevent diseases, infections, injuries that result in reduced absenteeism and therefore better productivity for the organisation for good health for the employee
4. Wash hands regularly using soap and water /sanitizer, not touch surfaces unnecessarily

B. Match the Columns

1. d. From the cleanest to the dirtiest area to avoid the clean areas from getting dirty or contaminated
2. c. At prominent places in the workplace for use by staff and visitors
3. a. Often with disinfectants and water
4. b. Where by during the course of their work, they wipe their desks, computers, telephones, etc once or twice a day using a sanitizing spray

Unit 8.3: Housekeeping and Waste Disposal

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the importance of good housekeeping at workplace
2. Explain safe methods of waste disposal
3. Dispose waste safely and correctly in the designated area
4. Explain methods to minimise environmental damage during work

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

What is housekeeping and why is it needed?

Say

Put up the slides. Housekeeping is not just cleanliness. It includes keeping work areas neat and orderly, ensuring floors are free of slip and trip hazards, removing of waste materials (e.g., paper, cardboard, materials that may cause accidents/fire). It also includes ensuring the layout of the entire workplace, including the aisles, storage / go-down facilities are well maintained and hazard and accident free. Good housekeeping practices help control or eliminate workplace hazards. It is not something that is done occasionally, but is an ongoing activity.

Explain

Explain the benefits of effective housekeeping, using the slide. Proceed to explain the different kinds of wastes. Discuss the different categories of wastes with examples as shown in the slide. Discuss the various methods of waste disposal.

Team Activity

Purpose: To explain the importance of safe disposal of waste.

Resources: Chart papers, pens, access to internet (if possible).

Methodology: Group discussion and presentation.

Tentative duration: 30 minutes.

Expected outcome: State the different methods of safe disposal of waste.

- Form three teams. Each team is given a theme—Reuse, Reduce, Recycle. The teams are to research/discuss for about 5 minutes on the meanings of the theme allotted to them. They are to make a chart on the steps they will take to implement the theme allotted to them. Using their

charts, the teams are to make presentations to the class.

- Post the presentation, show the slide on this subject and conclude.

Explain



Using the slide, explain the steps to adopt/propose at workplace to minimise environmental damage. Discuss each point by eliciting examples from participants from their own experiences.

Notes for Facilitation



- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1.
 - Clutter free, organised work area leading to ease and quick flow of inventory, supplies
 - Fewer chances of tripping, slipping, hitting against objects ensuring free and safe movement of staff
 - Decreased risk of fire hazards
 - Lower exposure of staff to dust, germs
 - Better hygienic conditions leading to improved health
 - Effective use of space
 - Improved morale and productivity
2. Recycling, reusing, vermicomposting
3. Using public transport or vehicle pooling, avoiding unnecessary travel, avoiding wastage of food

B. Match the Columns

1. c. By installing energy saving devices and office appliances which consume less energy and result in a lower electricity bill
2. d. Reduce the number of vehicles on the road and thereby the carbon emissions
3. b. Installing low-flow showerheads and aerated faucets to reduce the amount of water used
4. a. Training programmes for staff on the importance of avoiding waste, reusing, recycling materials as far as possible

Unit 8.4: Controlling Spread of Diseases at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the kinds of contagious diseases in your line of work
2. Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases
3. Explain the measures to control spread of contagious diseases

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

Name some common illnesses, infections, diseases that those working in the agriculture sector are likely to contract.

Say

- The responses expected are as follows - skin disorders, respiratory diseases, diseases caused due to toxic chemicals, pesticides, heat related illnesses, diseases transmitted from farm animals.
- The disorders/diseases can enter the body through the nose, skin, eyes, mouth causing allergies, infections caused due to dust, pollen, hay, straw, grain causing flu, headache, muscle pain, dizziness, irritations to lungs/eyes, rashes on the skin and so on. Not all of these may be contagious.

Explain

Explain the importance of recognising infections, illnesses at the right time and informing supervisors/ superiors at the work place about the same. Show the slide and explain the role of the employer and employee in this regard.

Team Activity

Purpose: To explain the measures to control spread of contagious diseases.

Resources: Chart papers, pens, access to internet (If possible).

Methodology: Group discussion and presentation.

Tentative duration: 15 minutes.

Expected outcome: State the measures to control spread of contagious diseases.

- Form four teams. Give each team a key word. Based on the key word, they are to arrive at the

various measures the employer as well as employee must undertake to control the spread of contagious diseases. The key words are as follows:

- Personal precautions
- Vaccination
- Workplace sanitation and hygiene
- Workplace policies
- Conclude the activity by summing up the points as given in the slide.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. To prevent the spread of infections, diseases to others at the workplace in order to safeguard others from contracting the infection/disease/illness. Further, the designated authority can take necessary actions to prevent the spread of the infection.
2. Cover the mouth and nose when while sneezing or coughing, washing hands with soap and water/sanitizer often, getting vaccinated

9. Safety and Emergency Procedures

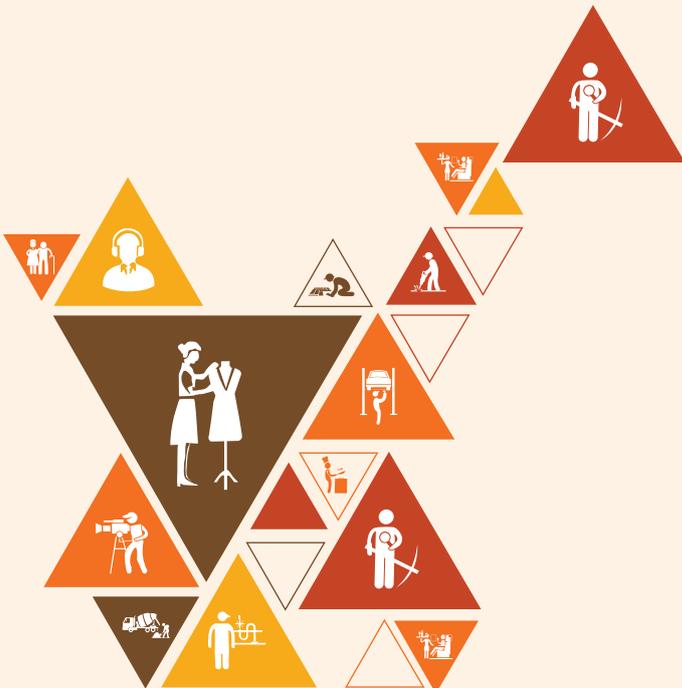
Unit 9.1 - Hazards at Workplace

Unit 9.2 - Personal Safety at Workplace

Unit 9.3 - Safety While Using Tools and Equipment

Unit 9.4 - Handling Accidents and Emergencies at Workplace

Unit 9.5 - Administering First Aid



Terminal Outcomes

After the completion of this module, participant will be able to:

1. Describe how to adhere to safety guidelines
2. Show how to administer appropriate emergency procedures

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. List the PPE required at the workplace 2. Describe the commonly reported hazards at the workplace 3. Describe the hazards caused due to chemicals/pesticides/fumigants 4. Describe the basic safety checks to be done before the operation of any equipment/machinery 5. Describe the common first aid procedures to be followed in case of emergencies 6. State measures that can be taken to prevent accidents and damage s at the workplace 7. Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures 8. State common health and safety guidelines to be followed at the workplace 	<ol style="list-style-type: none"> 1. Check various areas of the workplace for leakages, water-logging, pests, fire, etc. 2. Demonstrate how to safely use the PPE and implements as applicable to the workplace 3. Display the correct way of donning, doffing and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc. 4. Sanitize the tools, equipment and machinery properly 5. Demonstrate the safe disposal of waste 6. Demonstrate procedures for dealing with accidents, fires and emergencies 7. Demonstrate emergency procedures to the given workplace requirements 8. Demonstrate the use of emergency equipment in accordance with manufacturers' specifications and workplace requirements 9. Demonstrate the administration of first aid 10. Prepare a list of relevant hotline/ emergency numbers

Unit 9.1: Hazards at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the commonly reported hazards at the workplace
2. Describe the hazards caused due to chemicals/pesticides/fumigants
3. Check for hazards at workplace

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Start with a leading question that intends to establish the need to study this unit.

Ask

What do you understand by the term hazard?

Say

The term 'hazard' means probable danger or risk. It is important and mandatory to know the types of hazards that you may face at work. It will then be easy to prevent this risk at work.

Activity

Purpose: To acquaint the participants with workplace hazards.

Resources: Presentation slides.

Methodology: Game.

Tentative duration: 5 minutes.

Expected outcome: Familiarize participants with workplace hazards and its causes.

- Show the participants the presentation slide. Ask them to look at the picture and identify the hazards in the picture. Give them 5 minutes. Note the responses. Now, show them the next slide with the answers. Tell them that hazards at the workplace can cause illness, injury or even death. The hazards at work can occur due to:
 - Incorrect handling of equipment
 - Unsafe working practices
 - Behaviour of people
- Ask them to share their experience of being involved in a mishap that happened at work.

Explain 

Explain in detail about the type of workplace hazards and employees who are affected due to these hazards.

Ask 

- What are pesticides used for?
- Expected response:
 - Control organisms that are toxic or harmful to their environment.
 - Kill mosquitoes that spread dengue and malaria.
 - Kill or prevent insects that feed on crops in the agricultural sector.

Say 

- Pests of all types can cause harm to humans. Pesticides are used to control organisms that are toxic or harmful to their environment, control algae and weeds, control rats and insects that infect food stored in grocery stores and food storage facilities, kill mosquitoes that spread dengue and malaria and kill or prevent insects that feed on crops in the agricultural sector.
- Let us talk about the how these pesticides are used.

Explain 

Explain the categories of pesticides and talk about the pesticides and their uses in detail.

Elaborate 

Elaborate on the biodegradable and non-biodegradable pesticides and their uses.

Do 

Show the participants the video on impact of using chemical fertilisers and pesticides from the link given below (Duration: 3:35 minutes, Hindi) - Impact of Using Chemical Fertilisers and Pesticides - <https://www.youtube.com/watch?v=yTYobKlj6Uw>

Say 

- Using organic and biodegradable pesticides will help to save the soil, water, and health of all of us. Try and avoid non-biodegradable pesticides as much as possible.
- Let us look at the harm caused by toxic substances.

Elaborate

Elaborate on how the chemicals, pesticides, and fumigants can be detrimental to the health of humans and the diseases that are caused by them.

Say

- The harm caused by these toxic substances depends on dosage, exposure, sensitivity, and toxicity. The toxicity of these chemicals can be acute or chronic.
- Acute toxicity happens when a person develops symptoms within a few hours or a day. Chronic toxicity happens due to long-term exposure to the chemicals. This can cause long term adverse health effects in the person exposed.

Do

Show the presentation slide with the figure of diamonds of toxicity.

Ask

- What do you think these diamond figures represent?
- Expected response: Labels on chemicals and pesticides showing degree of toxicity.

Say

The toxicity labels red label, yellow label, blue label, and green label are mandatory labels pasted on pesticide containers in India. These identify the level of toxicity of the contained pesticide. The labelling follows a general scheme as laid down in the Insecticides Rules, 1971, and contains information such as brand name, name of manufacturer, name of the antidote in case of accidental consumption etc. A major aspect of the label is a colour mark which represents the toxicity of the material by a colour code.

Elaborate

Elaborate on HIRA and how it helps to prevent risks caused by hazards at the workplace.

Team Activity

Purpose: To acquaint participants with identifying and preventing hazards at workplace.

Resources: Presentation slides.

Methodology: Brainstorming.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to ask questions to identify workplace hazards, evaluate the risks, record the findings, and review the result.

- Divide the participants into four teams. Give each team one task given below:

1. Identifying the hazard
 2. Evaluating the risk
 3. Recording the finding
 4. Reviewing the result
- Ask each team to brainstorm and think of the questions that they will ask for each task. For example: For task one, a question that they can ask is who are at risk? Give them time to discuss and present their questions. Note the response. Show the participants the presentation slide with the answers and de-brief.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Skin rashes, eye irritation and conjunctivitis. ulcers in the mouth. gastro-intestinal disease like diarrhoea, nausea, vertigo, giddiness, and headaches, loss of sleep and disorders of the nervous system. disorders of the circulatory system and blood and cancer
2. By identifying the hazard, evaluating the risk, recording the finding, reviewing the result

B. Fill in the Blanks

1. Biodegradable
2. Non-biodegradable
3. Herbicides

Unit 9.2 Personal Safety at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. List the PPE required at workplace
2. Display the correct way of donning, doffing, and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc.

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible), PPE: gown, mask, gloves, googles or face shield.

Say

Personal Protective Equipment or PPE is the clothing and other equipment worn by a person at work. This helps in keeping the person safe from any injuries that may occur due to hazards at work. These hazards could be physical, biological, or chemical.

Ask

How does PPE protect you at work?

Expected response: PPE protects you from cuts and injuries, chemical spills, electric shocks, burns and falling objects.

Ask

What is the different type of PPE and what are they used for?

Explain

With the help of the presentation slide, explain the use of each type of PPE, how it protects the person and from what hazards.

Team Activity

Purpose: To acquaint participants with dos and don'ts of wearing PPE.

Resources: Presentation slides.

Methodology: Group discussion.

Tentative duration: 15 minutes.

Expected outcome: Familiarize participants with the dos and don'ts while using PPE.

- Divide the participants into groups of 3 or 4 as per class size. Ask each group to discuss and present the dos and don'ts while using PPE. Note their response. Show them the presentation slide with the dos and don'ts for using PPE.

Say

Wearing PPE is important as it minimises your injuries at work. It will make you feel secure, and your productivity will increase. The type of PPE you wear will depend on the level of protection you need at the workplace. It is important to wear the PPE in a proper manner. The outside surface of your PPEs will be contaminated, so always clean your hands with a hand sanitizer after removing the PPE.

Demonstration

Demonstrate the donning and doffing process for the PPE: gown, mask, gloves, goggles or face shield.

Activity

Purpose: To train participants in the donning and doffing of PPE.

Resources: Presentation slides, PPE: gown, mask, gloves, goggles or face shield for all participants

Methodology: Hands on practice.

Tentative duration: 30 minutes.

Expected outcome: Participants will be able don and doff the PPE following the correct procedure.

- Divide the participants into pairs. Give all the participants the PPE. Ask one participant to read the instructions slowly from the PH and the partner to follow the instructions and demonstrate the donning process and then the doffing process.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. The different type of PPE are:
 - Safety goggles and face shield
 - Full-face respirators, N-95 masks, gas masks
 - Hard hats and headgears
 - Safety vests and suits
 - Safety gloves
 - Knee pads and safety boots
 - Safety harnesses and lanyards
 - Earmuffs and plugs
 - List the steps for donning and doffing the mask
2. Steps for Donning the mask:
 1. Secure ties or elastic bands at the middle of head and neck
 2. Fit flexible bands to nose bridge
 3. Fit snug to face and below chin
 4. Fit-check respirator
3. Steps for Doffing the mask:
 1. Grasp bottom ties of the mask
 2. Grasp the ties at the top
 3. Remove mask without touching the front

B. Match the Columns

1. c. Falling from heights and serious injury or death
2. d. Burns, absorption of harmful substances, cuts, fractures, or amputations
3. b. Sprays of toxic liquids, splashes, and burns
4. a. Tasks that can cause hearing problems and loss of hearing

Unit 9.3: Safety While Using Tools and Equipment

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the basic safety checks to be done before the operation of any equipment/machinery
2. Sanitise tools, equipment, and machinery

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Start with a leading question that intends to establish the need to study this unit.

Ask

- Why is it important to maintain the tools and equipment that you use?
- Expected response: If tools and equipment is maintained well then it will help to diagnose the faults and manage risks of accidents and it will increase efficiency and reduce cost.

Say

Workers use equipment like hand tools, ladders, electrical power tools and larger machinery in shops and plants. The workers should make sure that the machinery and equipment they use is in good condition. If tools and equipment is maintained well then It will help to diagnose the faults and manage risks of accidents and it will increase efficiency and reduce cost.

Elaborate

Explain in detail how tools, equipment, and machinery can cause injuries.

Say

- People can get injured by moving parts of machinery or ejected material.
- Workers can get trapped rollers, belts, and pulley drives.
- The sharp edges of tools can cause cuts and severe injuries.
- Workers can get crushed, between machine parts moving together or towards a fixed part of the machine, wall, or other object.
- Workers can get burnt due to hot water and steam emissions from machines.
- Workers can be injured if the machinery develops faults or due to improper use because of lack of training.

- All machinery should be maintained regularly. Any worn or broken parts should be replaced and not fixed in a temporary manner. While repairing the tools and machines the workers should follow the manufacturers' specifications. Workers should also plan and communicate before starting any maintenance work otherwise it may lead to confusion and cause accidents.

Elaborate

Elaborate on the safety checks to be done before using vehicles, equipment and tools and hydraulic equipment.

Team Activity

Purpose: To acquaint participants with dos and don'ts of operating machines and tools safely.

Resources: Presentation slides.

Methodology: Group discussion.

Tentative duration: 15 minutes.

Expected outcome: Familiarize participants with the dos and don'ts while operating machines and tools safely.

- Divide the participants into groups of 3 or 4 as per class size. Ask each group to discuss and present the dos and don'ts while operating machinery and tools. Note their response. Show them the presentation slide with the dos and don'ts for using tools and machinery.

Say

Keeping equipment and machinery clean is very important for the agriculture industry. Agri products are used by grocery stores, manufacturers and other industries depend on agricultural products. Any kind of contamination in the agricultural products can be dangerous for the end consumer. In the agriculture industry it is mandatory to clean all the equipment every day.

Elaborate

Explain all the guidelines for cleaning and sanitising equipment.

Demonstrate

- Demonstrate how to clean the equipment used by the florist.
- Ask participants to volunteer and demonstrate the cleaning and sanitising procedure for tools and equipment used.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. If tools and equipment is maintained well then:
 - a. It will help to diagnose the faults and manage risks of accidents.
 - b. It will increase efficiency and reduce cost.
2. All machinery should be maintained regularly. Any worn or broken parts should be replaced and not fixed in a temporary manner. While repairing the tools and machines the workers should follow the manufacturers' specifications. Workers should also plan and communicate before starting any maintenance work otherwise it may lead to confusion and cause accidents.
3. The steps to clean and sanitise equipment/tools/machinery are:
 1. Remove any large pieces of debris from the equipment either by scraping or knocking it off
 2. Use tools like pressure washers to clean the rest of the contaminants
 3. Sanitise the newly cleaned surface using disinfectants to kill microorganisms like bacteria

B. Multiple Choice Questions

1. a. Tools and food
2. c. Loose clothing and dangling jewellery
3. a. Specifications given by the manufacturer

Unit 9.4: Handling Accidents and Emergencies at Workplace

Unit Objectives

After the completion of this unit, participant will be able to:

1. List some accidents, emergency situations and emergency services to use
2. State measures that can be taken to prevent accidents and damages at the workplace
3. Demonstrate use of emergency equipment in accordance with manufacturer's specifications and workplace requirements

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Activity

Purpose: To acquaint participants with the emergency situations that can occur at the workplace.

Resources: Presentation slides.

Methodology: Quiz.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to identify the emergency situations that can occur at the workplace.

- Show the presentation slides and ask the participants to identify the emergency situations one by one. Note their response.
- Post the quiz, show the presentation slide with the correct answers.

Explain

- An emergency can be a natural disaster or an accident. Workers can be involved in accidents at workplace, and these can be caused by the physical, biological or chemical hazards.
- There are three factors that contribute to accidents at the workplace chance occurrence, unsafe condition at the workplace and unsafe acts on the part of the employees.
- Let us do an activity to understand these factors.

Activity

Purpose: To increase the knowledge of participants about the different factors those contribute to accidents at workplace.

Resources: Presentation slides.

Methodology: Game.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to identify the factors that contribute to accidents at the workplace.

- First prepare 3 chits of paper. These will have one factor each that causes accidents. Select 3 participants and allot one chit each for factors:
 - Chance occurrence
 - Unsafe condition at the workplace and
 - Unsafe acts on the part of the employees
- Prepare small chits which will contain the names of all the examples that come under the three main factors. You can refer to the Participant Handbook for all the examples. Jumble up the chits and keep them in a bowl. Ask participants to pick a chit from the bowl and then walk to the factor under which the example given occurs. Show the presentation slide and explain the factors and the examples.

Say

Chance occurrences include medical emergencies like heart attack, weather conditions like floods and storms, natural calamities like earthquakes and sudden power failures. Unsafe conditions at the workplace are the biggest cause of accident at workplace. These are also called 'technical causes or 'improperly guarded equipment'. Unsafe acts on the part of employees are tasks or acts that a worker performs without any knowledge or skill.

Ask

- What is the importance of preparing for emergencies at the workplace?
- It helps to keep workers safe
- It can prevent life threatening situations
- It can minimise damage to the environment, equipment, machinery, tools, etc.

Do

Show the presentation slide for importance of preparing for emergencies.

Say

You need to have a good safety plan in place to minimise the workplace emergencies. The four elements of an emergency plan include prevention, preparation, response, and recovery. Prevention includes policies and procedures to minimise the occurrence of emergencies. Preparation are all the activities and procedures to make sure your organisation is ready to effectively respond. Response is the action to be taken when an emergency occurs. Recovery means all the practices to resume to normal business operations

Do

Show the presentation slide for implementing the emergency plan and describe how the plan must be implemented in an organisation.

Team Activity

Purpose: To acquaint participants steps to follow while dealing with accidents.

Resources: Presentation slides.

Methodology: Brainstorming.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to describe the steps to follow while dealing with accidents.

- Divide the participants into 4 groups. Give them each one accident situation at work place. Ask the groups to discuss and present the steps they will follow while dealing with accidents.

Explain

It is important to respond and report an accident quickly as this can prevent a similar accident from recurring.

Say

The steps to follow while dealing with accidents are:

1. Provide first aid to the injured workers. Contact emergency medical services if required.
2. Fill the workplace injury/illness report form for the injured workers.
3. Report the accident to your supervisor as per the company rules.
4. Investigate the accident as soon as possible. This will help to gather physical evidence, take photographs, and interview witnesses to understand the chain of events that led to the accident.
5. Identify the causes of the accident. There may be more than once cause for the accident.
6. Plan for corrective actions to prevent the accidents from happening again. These actions should address the root causes of the accident.
7. Implement the corrective action. Set a timeline to implement and monitor these actions.
8. Submit the findings in a written report. Prepare a step-by-step account of the accident.

Explain

Explain the importance of an effective evacuation plan during a fire. Fire accidents can be life-threatening and fatal.

Say

Protection from threats of fire accidents starts with prevention. To prevent fires at the workplace one must keep the following ready. It is very important to participate in the fire drill exercises arranged by the management at regular frequencies. The evacuation plan will train employees to follow the instructions of the fire warden, move promptly and calmly through the nearest exit and assemble at the designated area. Fire extinguishers must be installed at all workplaces. The steps

to use the fire extinguisher are:

P: Pull the pin

A: Aim the nozzle at the base of the fire

S: Squeeze the handle

S: Sweep from side to side

Do

- Show the participants the following two videos.
- Video 1: Demonstrates the steps to use the fire extinguisher from the link given below (Duration: 3:24 minutes).
How to use Fire Extinguisher - <https://www.youtube.com/watch?v=6mX07wNJuYE>
- Video 2: Explains the best practices to be followed for fire safety from the link given below (Duration: 3:06 minutes).
8 Best Practices for Industrial Fire Safety - <https://www.youtube.com/watch?v=VTfJZ0Y5k2w>

Activity

Purpose: To train the participants to use the fire extinguisher and understand the guidelines to be followed if a fire occurs.

Resources: Presentation slides, fire extinguisher.

Methodology: Guest lecture and demonstration.

Tentative duration: 60 minutes/depending on the duration chosen by the guest.

Expected outcome: Participants will be able use the fire extinguisher to douse fire and explain the guidelines to be followed if a fire occurs.

- Arrange for a guest lecture to demonstrate the steps to use the fire extinguisher.
- The guest lecture should include how to deal with fire at the workplace and the guidelines to be followed if a fire occurs. Ask a few participants to volunteer and demonstrate the steps to use the actual fire extinguisher.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Unsafe conditions and unsafe acts on the part of the employees are the biggest cause of accidents at workplace. Example: Faulty equipment, operating equipment without permission, not wearing PPE
2. The 4 elements of an emergency plan are:
 1. Prevention
 2. Preparation
 3. Response
 4. Recovery
3. The correct sequence of steps to use the fire extinguisher 3,1,4, 2.

B. Look at the pictures and identify the emergency situation in each

- a. Explosion
- b. Earthquake
- c. Hazardous material spills

Unit 9.5: Administering First Aid

Unit Objectives

After the completion of this unit, participant will be able to:

1. Describe the common first aid procedures to be followed in case of emergencies
2. Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures
3. Demonstrate administration of first aid
4. List some local emergency services

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Start with a leading question that intends to establish the need to study this unit.

Ask

- What do you understand by first aid?
- Expected response: First aid is the first help or support that you give to a person who is sick or involved in an accident. First aid does not mean giving medical help like medicines.

Elaborate

Define first aid. Elaborate on the universal rule of first aid.

Ask

- Why do you think it is important to report the first aid administered to the reporting officer at your workplace?
- Expected response: To keep all employees safe and prevent accidents from happening.

Say

- Every employee or worker in a company is responsible for the safely handling equipment and machinery, however accidents can happen due to human error or technical faults.
- It is important to report these accidents and the first aid that has been administered as the data gathered about the injuries can be tracked on a regular basis.
- The safety teams and the supervisors of the company can then find solutions to the problems to prevent future injuries due to accidents.

Team Activity

Purpose: To acquaint participants with questions to be asked to gather data needed for the first aid report.

Resources: Presentation slides.

Methodology: Discussion.

Tentative duration: 15 minutes.

Expected outcome: Participants will ask questions to gather data needed for the first aid report.

- Divide the participants into 4 groups. Ask them to discuss the questions that they will have to ask to gather data to create a first aid report. Ask them to discuss and present the questions.
- Post the presentation, use the next slide and de-brief.

Say

The data gathered during first aid will help to identify potential problem area that need to be addressed. It will improve employee morale and attitude towards health and safety. It will reduce the frequency and the cause of future similar accidents and will save cost to the company as similar incidents are prevented.

Activity

Purpose: To train participants to write a report after administering first aid.

Resources: Presentation slides.

Methodology: Learning by doing.

Tentative duration: 30 minutes.

Expected outcome: Participants will be able to write a report after administering first aid.

- Divide the participants into pairs. Tell them that there has been an accident at the workplace. Ask the participants to assume an example of an accident at workplace—For example: one of their colleagues is hurt as a heavy box fell on him.
- The participants will work in pairs and prepare a format and fill in the report of the accident. Guide the participants while they fill the form. Ask them to read out the report one by one.
- The report must include the following details:
 1. Date of the report
 2. Status of victim
 3. Name of victim
 4. Contact details of the victim
 5. Person to contact in case of emergency
 6. Reporting supervisor of the victim
 7. Department
 8. Location
 9. Date and time of accident
 10. Address or location where accident occurred

11. Specific location where accident (Stairs, Loading Dock, Room or Lab etc.)
12. Cause of accident (types: illness, negligence, safety issues, etc.)
13. How and why did this accident occur (details/description)
14. Was this a WORK-RELATED accident: Yes/ No
15. Was first-aid administered to the victim? Yes/ No
16. Was professional medical attention required or recommended for this
17. injury/illness? Yes No
18. Name and Signature of person completing report
19. Report sent to:
 - a. Safety department
 - b. Department responsible for the accident
 - c. Department of the victim
20. Corrective action taken by responsible department
21. Preventive action recommended
22. Additional corrective actions

Say

- The prime reason for an investigation of any industrial accident is to prevent the recurrence of that accident. Simply put, finding out the causes of accidents is very helpful in controlling or eliminating such accidents in the future.
- To understand the causes of any accident that occurs in an organization, why and how this accident happened, you need to gather all the facts pertaining to before and during the incident.

Ask

As a first person responding to an accident victim or a person who is sick, you should help the victim. How will you help the person? What will be the first thing that you will do?

Say

Before giving first aid to a person involved in an accident, you will need to assess the risk or is it safe for you to help the person. Then must check the injured person by calling out or shaking him/her to see if the person is responding. Then, call the emergency medical services. Never leave the injured person unattended. If the person is breathing but unconscious, place the person on one side (recovery position). If the person is bleeding, cover the wound with a gauze or towel or any other cloth and try to control the bleeding by applying direct pressure. Elevate the bleeding body part above the person's head if you can. If the person has a fracture, then do not move the person.

Do

- Use the presentation slides to describe the procedure to administer first-aid.
- Show the presentation slide with the emergency helpline numbers.

- Ask the participants to save these numbers in their mobile phones.

Activity

Purpose: To train the participants to administer first aid for different type of injuries and learn the guidelines to be followed if a fire occurs.

Resources: Presentation slides, first aid box, fire extinguisher

Methodology: Guest lecture and demonstration.

Tentative duration: 60 minutes/depending on the time duration set by the guest.

Expected outcome: Participants will gain basic knowledge on administering first aid for different types of injuries and follow the guidelines in case of a fire.

- Arrange for a guest lecture:
 - To talk about first aid and demonstrate the steps to administer first aid for different type of injuries. Ask a few participants to volunteer and demonstrate the steps to administer first aid.
 - To understand the guidelines to be followed in case of a fire. Ask a few participants to volunteer and
- Demonstrate the steps to use a fire extinguisher
- Conduct a mock fire drill and evacuation.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- Print copies of the report form and distribute to the participants for the activity.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Universal Rule of First Aid:
 - Ensure you are safe, before helping the injured or sick.
 - Leave the area or evacuate immediately if there is any risk.
 - Protect yourself from any transmissible diseases while helping others. If possible, wear a PPE.
 - Cover your own wounds with a cloth or bandage before helping the injured.
 - If possible, use disposable gloves to avoid contact with blood and body fluids. If gloves are not available, then use plastic bags.
 - Wash your hands with soap immediately after helping the injured and sick.
 - Do not move or shake the injured person if you think he/she has suffered from a spinal injury.
2. It is important to report these accidents and the first aid that has been administered as the data gathered about the injuries can be tracked on a regular basis. The safety teams and the supervisors of the company can then find solutions to the problems to prevent future injuries due to accidents.
3. The procedure to administer first aid:
 - a. Assess the situation
 - b. Check the victim for response
 - c. Call for help
 - d. Assess the victim's condition
4. The emergency helpline number for:
 - Police 100
 - Ambulance 102
 - Fire Brigade 101
 - National Emergency 112

B. Multiple Choice Questions

1. d. first help or support
2. c. Pull the injured person by hands or legs and move him/her from the site
3. c. It is important to report and record



10. Repair and Maintenance of Farm Implements

Unit 10.1 – Tillage Machinery

Unit 10.2 – Ploughing

Unit 10.3 – Tillage Implements

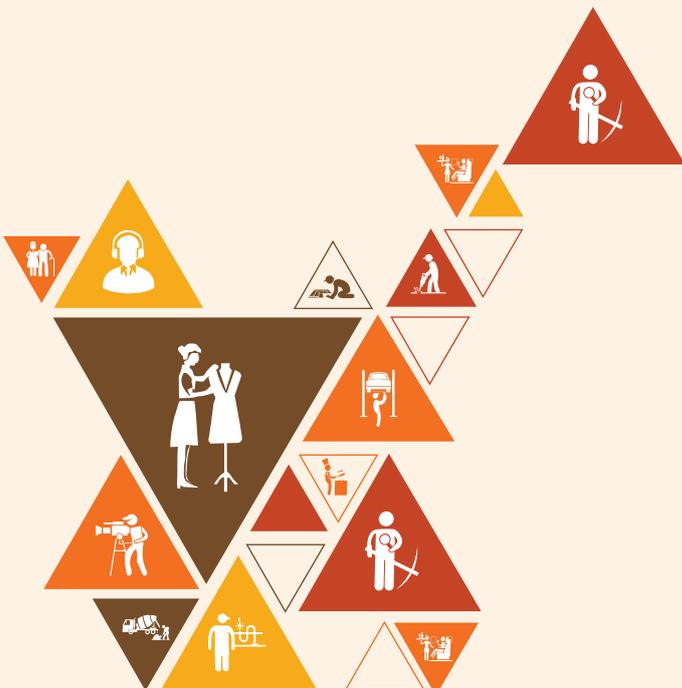
Unit 10.4 – Disc Harrow – Adjustment, Operation and Maintenance

Unit 10.5 – Disc Plough – Adjustment, Operation and Maintenance

Unit 10.6 – M.B Plough – Adjustment, Operation and Maintenance

Unit 10.7 – Adjustment and Maintenance of Seeding and Planting Equipment

Unit 10.8 - Welding on Broken Joints



AGR/ N1119

Terminal Outcomes

After the completion of this module, participant will be able to:

1. Demonstrate the process of checking the mouldboard plough, disc plough, disc harrow and cultivator for faults, wear and tear or damage
2. Demonstrate the process of carrying out repair and maintenance of mouldboard plough, disc plough, disc harrow and cultivator

Key Learning Outcomes

After the completion of this module, participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> 1. Explain the design and functions of primary and secondary tillage machinery 2. Identify various components of a mouldboard plough, disc plough, disc harrow and cultivator 3. Explain the common repair and maintenance needs of the mouldboard plough, disc plough, disc harrow and cultivator 4. Describe the process of adjusting the gauge and wheel disc, tilt angle and working depth of the tillage machinery 5. Explain the necessary safety measures to be undertaken while operating the tillage machinery 	<ol style="list-style-type: none"> 1. Demonstrate the process of checking the mouldboard plough, disc plough, disc harrow, cultivator and their components for correct functioning, wear and tear or damage 2. Analyse the joints, nuts, bolts and pins for locking and the prescribed torque 3. Demonstrate the process of making various adjustments such as correcting the level of plough, horizontal and vertical suction, level of the cultivator to ensure all the shovels touch the ground, etc. 4. Demonstrate the process of carrying out welding on broken joints

Unit 10.1: Tillage Machinery

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the design and functions of primary and secondary tillage machinery
2. Understand the necessary safety measures while operating the tillage machinery

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Bring two flower pots in the class—one with hard soil and the other with soft tilled fertile soil.

Ask

- Which pot would you prefer for sowing?
- Which pot will help grow your seeds better?
- What would you do to loosen the hard soil in one of the flower pots?

Activity

Purpose: To establish the importance of tilling.

Resources: Presentation slides, Flower Pots, Trowel, Seeds/Sapling, Water.

Methodology: Learning by doing.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to establish the importance of tilling/digging soil for plantation.

- Ask one of the volunteers to come forward and use the trowel to prepare the hard soil in the flower pot for sowing seeds.

Ask

- What did you understand by the activity?
- What is the process of treating the hard soil or breaking the soil crust called?

Say

You have just loosened up the soil to make it aerated for better permeation of air and water for seed germination. This is what we do by tilling farms. Tillage is the mechanical manipulation of soil to provide favourable condition for crop production by breaking the compact surface of earth to

certain depth and loosening the soil mass so that roots of the crop penetrate and spread into the soil. The prime objective of tillage is to improve soil aeration for better gaseous exchange both in soil and root area. This helps in better yield of a crop.

Explain

Show the presentation slides and explain the farming tasks done to till the soil and classification of tillage.

Ask

Do you think there is only one standard of way of soil tilling or there are many ways of tilling?

Explain

Show the presentation slides and explain the types of tillage and advantages and disadvantages of each. Also, explain the safety measures for using tillage machinery.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Primary and secondary tillage

Primary Tillage	Secondary Tillage
Mild board plough	Disc or other harrow
Disc plough	Cultivators
Heavy duty disc plough	Sweeps
Chisel plough	Tillers
Rotavator	

2. Main objectives of tillage:

- Reduces mechanical energy and labour
- Conservessoil moisture and reduce soil erosion
- Optimises soil conditions
- Minimises trips to field

3. Difference between strip and rotary tillage:

- In rotary tillage system only isolated bands of soil are tilled.
- In rotary tillage soil is cut, broken and mixed.

4. Requirements of rotary tillage

- Low or Negative Draft Requirements
- High Power Requirements
- Excessive Pulverization

5. Necessary safety measures taken while operating farm equipment and machinery:

- Read and follow the handbook
- Obey and comply with federal and state laws
- SMVs should always be clean, visible, and correctly mounted
- Dress appropriately
- Make sure you're well rested
- Avoid Alcohol
- Maintain Awareness
- Adjust equipment accordingly
- Keep children and animals away from working areas
- Read up about planter equipment safety

B. Fill in the Blanks

1. d. All of the above
2. c. Sweeps

C. Match the Columns

1. a. Mild board plough
2. b. Disc plough
3. c. Cultivator

Unit 10.2: Ploughing

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the ploughing based on field coverage
2. Explain the methods of ploughing

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Ask

- Have you ever seen a farmer ploughing a field?
- What happens to the soil when it is ploughed?

Say

Ploughing is the major tillage operation that is performed on soil to partially or totally cut, break and invert the soil.

Do

Show the presentation slides and explain different types of ploughing, ploughing terminology and methods of ploughing.

Demonstrate

- Take participants to a lab facility/work area/garden.
- Demonstrate participants:
 - Normal ploughing, contour ploughing, land ploughing
 - Furrow creation: back furrow, dead furrow, furrow slide, furrow wall
 - Gathering, casting, continuous ploughing method, round and round ploughing
- Quiz students to test the knowledge of demonstrated concepts.
- Estimated time for the demonstration is 4 hours.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Types of ploughing:
 - Normal ploughing
 - Contour ploughing
 - Land ploughing
2. Ploughing terminology:
 - Dead furrow: Open trench left in between two adjacent strips of land after finishing the ploughing
 - Crown: Top portion of turned furrow slice
 - Furrow slice: Undisturbed soil surface by the side of furrow
 - Furrow wall: Mass of soil cut, lifted and thrown to one side
 - Headland: While ploughing with a tractor a strip of unploughed land is left at each end of the field for tractor to turn. It is twice the width of the implement

B. Match the Columns

1. b. When a plough works its way around a strip of unploughed land
2. a. When a plough works its way around a strip of ploughed land
3. c. Very convenient and cost effective under normal conditions
4. d. This method is used when ridges and furrows interfere with cultivation activities

C. Fill in the Blanks

1. 15 cm
2. Contours
3. Furrow slice

Unit 10.3: Tillage Implements

Unit Objectives

After the completion of this unit, participant will be able to:

1. Understand the functioning of mouldboard plough, disc plough, disc harrow and cultivator

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Ask questions to test knowledge of participants on the types of tillage they studied in Unit 10.1 and recap.

Activity

Purpose: To familiarise participants with the different types of tillage implements.

Resources: Presentation slides.

Methodology: Quiz.

Tentative duration: 15 minutes.

Expected outcome: Participants will be able to identify different types of tillage implements.

- Show the participants the presentation slides with 5 quiz questions. Ask them to look at the pictures of the tillage implement and identify them.
- Give them enough time to respond. Note the response. Now, show them the presentation slides with the answers.

Explain

Show the presentation slides to explain the tillage implements used for farming, seed layout, sowing and inter cultivation in detail.

Field Visit

Purpose: To help participants identify different types of tillage implements available in the market.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 8 hours.

Expected outcome: Participants will be able to identify different types of tillage available in the market.

- Arrange a visit to a dealer who sells tillage implements.

- Divide the class into 2 groups.
 - Ask Group 1 to participants to research on the following tillage implements:
 - Wooden plough or indigenous plough
 - Soil turning ploughs
 - Mouldboard plough
 - Disc plough
 - Turn-wrest or reversible or one-way plough
 - Subsoil plough
 - Chisel plough
 - Ridge plough
 - Rotary plough or rotary hoes
 - Country plough
 - Basin lister
 - Ask Group 2 to participants to research on the following tillage implements:
 - Tractor drawn cultivator
 - Sweep cultivator
 - Disc harrow
 - Blade harrow
 - Indigenous blade harrows
 - Plank and roller
 - Bund former
 - Seed drill
 - Ferti-cum-seed drill
 - Mechanical seed drill
 - Small sized blade harrows
 - Tobacco blade harrow
 - Participants need to include the following details for each implement; its:
 - Category
 - Pricing
 - Usage
 - Advantages and disadvantages
 - After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Uses of implements:

- Subsoil plough: Breaks up hard layers or pans without bringing them to the surface
- Chisel Plough: Breaks hard pans; Ploughs deep ploughing (60-70 cm) with less disturbance to the top layers
- Ridge Plough: Makes broad bed and furrows by attaching two ridge ploughs on a frame at 150 cm spacing between them
- Rotary plough: Cuts the soil and pulverizes it
- Basin lister: In low rainfall locations, this implement is used to produce listed furrows (broken furrows with minor dams and basins) to prevent free drainage of rainfall and blowing off the land

B. Match the Columns

1. a. Wooden ploughs, iron or inversion ploughs and special purpose ploughs
2. b. Cultivators, harrows, planks and rollers
3. c. Ploughs to a depth of 15 cm or 25-30 cm depends how it is driven
4. d. Breaking clods and destroy weeds

C. Multiple Choice Question

1. d. Mechanical seed drill
2. c. Both a and b
3. d. Both a and b

Unit 10.4: Disc Harrow-Adjustment, Operation and Maintenance

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the common repair and maintenance needs of the disc harrow
2. Understand the process of adjusting the gauge and wheel disc, tilt angle and working depth of the disc harrow

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Show the image of disc harrow from the presentation slide and ask participants its name and purpose in farming.

Collect the answers and show the correct answer on the slide.

Say

Disc harrow is designed for harrowing / land preparation of rough soil. It is generally used for partially inverting the soil and breaking the clods.

Explain

Show the presentation slides and explain adjustments in a disc harrow, operation guidelines for a disc harrow and maintenance of a disc harrow.

Demonstrate

- Take the participants to the lab facility/work area and show the functioning of disc harrow and the difference in soil before and after using the disc harrow.
- Show how to make various adjustments in disc harrow and a cultivator and generic maintenance checks for the disc harrow and the cultivator.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To help participants observe and carry out repair and maintenance of disc harrows and cultivators.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 6 hours.

Expected outcome: Participants will be able to carry out repair and maintenance of disc harrows and cultivators.

- Arrange a visit to a tractor workshop.
- Divide the batch into two groups.
- Ask one group of participants to learn and practice how to:
 - Inspect the disc gang angle and gang assembly for wear and tear or damage
 - Check the scrapper for correct assembly
 - Inspect the depth control system for correct functioning
 - Check the angle of hitch and hitch parts
 - Examine all joints, bolts, nuts and pins for the prescribed torque and locking
 - Measure the disc spacing and diameter for the prescribed dimensions
 - Sharpen the harrow discs
 - Apply the recommended grade of grease/lubricant on bearing assembly, mating parts and greasing points
 - Replace any damaged discs, spool flanges, gang-bolts and gang bearings as per the SOP
 - Replace the worn out or damaged pins, nuts and bolts with the new ones
- Ask another group of participants to learn and practice how to:
 - Examine the level of the cultivator to ensure all the shovels touch the ground
 - Check the shovel for the correct angle
 - Inspect the tyres for uniform spacing
 - Check the nuts and bolts for the prescribed torque and locking
 - Remove accumulated soil, trash or grease on the cultivator by washing it
 - Apply grease/lubricant on all nuts and bolts
 - Replace the worn out or damaged shovel points
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Operating implements in compliance with manufacturer instructions results in:
 - Regularity
 - Satisfaction
 - Economical
 - Long life
2. Process of storage of machine after work
 - Wash the disc harrow after use
 - Replace the worn-out nuts and bolts
 - If the disc harrow has to remain idle for long time, then clean and lubricate it

B. Match the Following

1. a. Increase for better penetration in dry soil
2. b. Loose the bolt at scrapper clamp
3. c. Controlled hydraulically by raising or lowering the left control lever
4. e. Rear gang lowered
5. d. Rear gang raised

C. Multiple Choice Question

1. a. Disc not running level – Adjust using levelling lever
2. a. Field too wet - Disc at shallow depth for first pass to speed up drying process
3. d. All of the above

Unit 10.5: Disc Plough—Adjustment, Operation and Maintenance

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the common repair and maintenance needs of the disc plough
2. Understand the process of adjusting the gauge and wheel disc, tilt angle and working depth of the disc plough

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

Show the image of disc plough from the presentation slide and ask participants its name and purpose in farming.

Collect the answers and show the correct answer on the slide.

Say

A disc plough consists of a series of individually mounted, inclined disk blades on a frame supported by furrow wheel. A tractor mounted disc plough has only a rear furrow wheel. They work most suitably where mould board plough does not work satisfactory such as in hard soil, dry soil, sticky soil, dry soil, loose soil and push type soil. It equipped with heavy duty tubular frame specially designed for deep ploughing and land preparation of rough soil.

Explain

Show the presentation slides and explain adjustments in disc plough, safety considerations for disc plough and maintenance of disc plough.

Demonstrate

- Take the participants to the lab facility/work area and show the functioning of a disc plough and the difference in soil before and after using the disc plough.
- Show how to make various adjustments in disc plough and generic maintenance checks for the disc plough.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To help participants observe and carry out repair and maintenance of disc ploughs.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 6 hours.

Expected outcome: Participants will be able to carry out repair and maintenance of disc ploughs.

- Arrange a visit to a tractor workshop.
- Ask participants to learn and practice how to:
 - Inspect all nuts and bolts for locking and the recommended torque
 - Check the bearings and castle nuts are secured tightly
 - Clean the hub of disc plough using diesel oil
 - Adjust the horizontal disc angle, vertical tilt angle, width of cut, level of plough and scrapper position as per the service manual
 - Change the degree of hub by loosening the mounting bolts when the diameter of disc reduces below the prescribed level
 - Apply the recommended grade of lubricant on bearings, bearing housing, coulter hub and all greasing points
 - Replace the grease nipple if contaminated with soil
 - Replace the worn-out disc plough hub seal with a new one
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Necessary adjustments required in disc plough are:
 - Cutting angle adjustment
 - Width of cut adjustment
 - Levelling the plough
 - Tightening the bearing
 - Scrapper adjustment
 - Draft of the disc plough
 - Adjustments for deep ploughing
2. Factors affecting draft:
 - Bearing conditions of the bearing housing
 - Depth and width of cut per bottom for complete plough
 - Speed increases the draft, doubling the speed increases the draft 20-25%
3. Adjustments required for deep ploughing:
 - Adding extra weight to the plough
 - Reducing the tilt angle
 - If the ground is covered with trash, set the disc in almost vertical position and add weight to the plough; in such soils notched disc gives better results

B. Match the Columns

1. a. $42^\circ - 45^\circ$
2. b. $15^\circ - 25^\circ$
3. d. Improves the disc penetration
4. c. Improves disc penetration in loose and brittle soils

C. Fill in the Blanks

1. Disc plough
2. Scrapper
3. Add weight
4. Angle

Unit 10.6: Mould Board Plough-Adjustment, Operation and Maintenance

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the common repair and maintenance needs of the mould board plough
2. Understand the process of adjusting the gauge and wheel disc, tilt angle and working depth of the mould board plough

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Do

- Show the image of mould board plough from the presentation slide and ask participants its name and purpose in farming.
- Collect the answers and show the correct answer on the slide.

Say

Mould board plough is one of the oldest and most important tillage implement. Ploughing required more traction energy than any other field operation. Some yield studies revealed under certain conditions with some crops there is no apparent advantage in ploughing, the mould board plough is still the most used implement for primary tillage in seedbed preparation. Mould board plough is equipped with heavy-duty box frame specially designed for deep ploughing and land preparation of rough soil. It is designed to work in all types of soils for basic function such as soil breaking, soil turning and soil raising. It can handle the toughest ploughing job with outstanding penetration performance.

Explain

Show the presentation slides and explain adjustments in mould board plough.

Demonstrate

- Take the participants to the lab facility/work area and show the functioning of a mould board plough and the difference in soil before and after using the mould board plough.
- Show how to make various adjustments in mould board plough and generic maintenance checks for the mould board plough.
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To help participants observe and carry out repair and maintenance of mould board ploughs.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 6 hours.

Expected outcome: Participants will be able to carry out repair and maintenance of mould board ploughs.

- Arrange a visit to a tractor workshop.
- Ask participants to learn and practice how to:
 - Check the mouldboard plough for smooth movement
 - Inspect that the nuts and bolts are secured tightly
 - Remove soil and any other waste from the mouldboard plough
 - Apply grease/lubricant on mouldboard plough to prevent rusting
 - Sharpen the bar point and shares
 - Adjust the level of the plough, horizontal suction, vertical suction and draft of the plough
 - Replace any worn-out or damaged parts as per the Standard Operating Procedure (SOP)
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Steps for tractor preparations are:
 - The horsepower of tractor selected should match the implement
 - Adjust the front and rear wheel track width
 - Provide adequate front-end ballast for tractor stability
 - All plough adjustment should be carried out
 - Select load and depth control setting according to tractor operators manual
2. Necessary adjustments required for mould board plough are:
 - Levelling the plough
 - Horizontal suction or land suction
 - Vertical suction or down suction
 - Draft of the M B plough
 - Adjustment for deeper ploughing
3. Definition of terms:
 - Horizontal suction: Horizontal suction is the amount the point of share is bend off line with the land side. Horizontal suction is measured by placing a straight edge on the side of the plough extending from the heel of the landside to the point of share, then measuring horizontally the greatest distance from the straight edge to the plough bottom. The amount is usually about 3/16 inch.
 - Vertical suction: This is the bend downward of the point of share to make the plough penetrate the soil to the proper depth when the plough is pulled forward. This suction can be measured by placing a straight edge on the bottom of the plough extending from the heel of the bottom of land side to the point of share, then measuring vertically and the greatest clearance from the straight edge to the plough bottom.

Unit 10.7: Adjustment and Maintenance of Seeding and Planting Equipment

Unit Objectives

After the completion of this unit, participant will be able to:

1. Explain the common repair and maintenance needs of the mould board plough
2. Understand the process of adjusting the gauge and wheel disc, tilt angle and working depth of the mould board plough

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Say

After preparing the soil using the appropriate tillage machinery, seeding equipment can be used to sow seeds at required row to row spacing and depth and planting equipment can be used to plant the seed at required row to row and plant to plant spacing and depth. This machine can be used for sowing grains like maize, groundnut, peas, cotton and sunflower. Planting disc plates for various crops can be changed without disassembling the seed hopper's main shaft. Fertilizer can be used concurrently if necessary. U clamps have been used to mount furrow openers to the frame. To make it a bed planter, these can be swapped out for ridges and bed shapers.

Explain

Show the presentation slides and explain the adjustments of a multi crop planter, safety precautions to be taken while operating planters, planting operations and maintenance of seeding machines.

Demonstrate

- Take the participants to the lab facility/work area and show the functioning of seeding and planting equipment.
- Show participants the adjustment of:
 - Planters
 - Furrow openers and ridges
 - Bed shaper
 - Seed metering speed
 - Seed metering for soyabean, maize, chick pea and Bengal gram, ground nut, hybrid maize
 - Calibration of seeding and planting equipment
- Allow participants to practice the steps demonstrated.
- Estimated time for the demonstration is 4 hours.

Field Visit

Purpose: To help participants observe and carry out repair and maintenance of seeding and planting equipment.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 4 hours.

Expected outcome: Participants will be able to carry out repair and maintenance of seeding and planting equipment.

- Arrange a visit to a tractor workshop.
- Ask participants to learn and practice the maintenance of:
 - Planters
 - Seed and fertilizer boxes
 - Seed metering mechanism
 - Fertilizer metering mechanism
 - Furrow openers
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Difference between planting and seeding equipment:
 - Planting equipment is used to plant the seed at required row to row and plant to plant spacing and depth
 - Seeding equipment is used for sowing of seed at required row to row spacing and depth
2. $W = n \times d$
3. $100 \times 100 / \pi \times D \times W$

B. Match the Columns

1. a. Use the 16-spoon plane plate
2. b. Use the 8-spoon inclined plate no "0"
3. c. Use the 8-spoon inclined plate no "20"
4. d. Use the 8-spoon inclined plate no "30"

C. Fill in the Blanks

1. Hopper's main shaft
2. Removing and raising
3. 35-45 HP, 15-30 cm

Unit 10.8: Welding of Broken Joints

Unit Objectives

After the completion of this unit, participant will be able to:

1. Demonstrate the process of carrying out welding on broken joints

Resources to be Used

Participant handbook, Presentation slides, Whiteboard, Markers, Projectors, Laptop, Internet connection (If possible).

Say

When you deal with any machinery, welding is an important part of the machine maintenance. There are three most important set of operations for repair welding: preparation repair and post welding operations.

Explain

Show the presentation slides and explain the three steps of repair welding, rebuilding and overlaying, selection of welding process in detail.

Activity

Purpose: To help participants understand the relevant environmental and occupational hazards and the ways to deal with them.

Resources: Observation sheets, Pen and paper.

Methodology: Guest lecture.

Tentative duration: 2 hours.

Expected outcome: Participants will be able to understand the relevant environmental and occupational hazards and the ways to deal with them.

- Arrange a guest lecture for the participants and cover the following topics:
 - Importance of service and maintenance of tillage machinery
 - Importance and use of relevant PPE while using and repairing machinery
 - Relevant environmental and occupational hazards and the ways to deal with them

Demonstrate

- Take the participants to the lab facility/work area and show the difference between the welding processes by using the products that are welded using different processes.
- Explain the advantages and disadvantages of each process and the right way of choosing the correct welding process.
- Estimated time for the demonstration is 2 hours.

Field Visit

Purpose: To help participants observe and carry out welding of broken joints of tillage machinery.

Resources: Observation sheets.

Methodology: Observation.

Tentative duration: 4 hours.

Expected outcome: Participants will be able to carry out welding of broken joints of tillage machinery.

- Arrange a visit to a tractor workshop.
- Ask participants to learn how to choose the right welding process in a particular situation
- After that they should:
 - Pick any tillage, seeding or planting equipment with broken joints
 - Inspect the workshop to ensure the area is safe for welding
 - Put on the PPE
 - Weld the broken joints
- After participants return to the class, they will share their experience and the information with the class.

Notes for Facilitation

- Give a sneak peak of what is to come in the forthcoming units within this module.
- End by urging participants to open up their Participant Handbooks and solve the exercises given at the end of the unit. Discuss the answers to the exercises in the class.

Exercise

Key Solutions to PHB Exercises

A. Short Questions

1. Important steps of repair welding:

- Welding procedure
- Welding equipment
- Material
- Alignment markers
- Welding sequences
- Safety
- Weld quality

2. Definitions:

- Shielded metal arc welding: The shielded metal arc welding procedure is arguably the most extensively used of the hard facing welding processes. It can be used in the field and in the shop, on tiny and large parts in any situation
- Submerged arc welding: Submerged arc welding is also employed in many applications; however, it can only be done in the flat position. It is typically employed in industrial operations rather than in the field
- Flux cored arc welding: Flux-cored arc welding with and without shielding gas is a popular semiautomatic welding process. It can be used in the field or in the shop and is not restricted to the flat position
- Gas tungsten arc welding: The gas tungsten arc welding procedure is utilised for a variety of smaller applications, most commonly for shop work where the part may be brought to the shop and manipulated and moved for ease of welding



11. Employability Skills (60 Hours)

To access content on Employability Skills, click here:

<https://eskillindia.org/NewEmployability>

Scan the QR code below to access the ebook

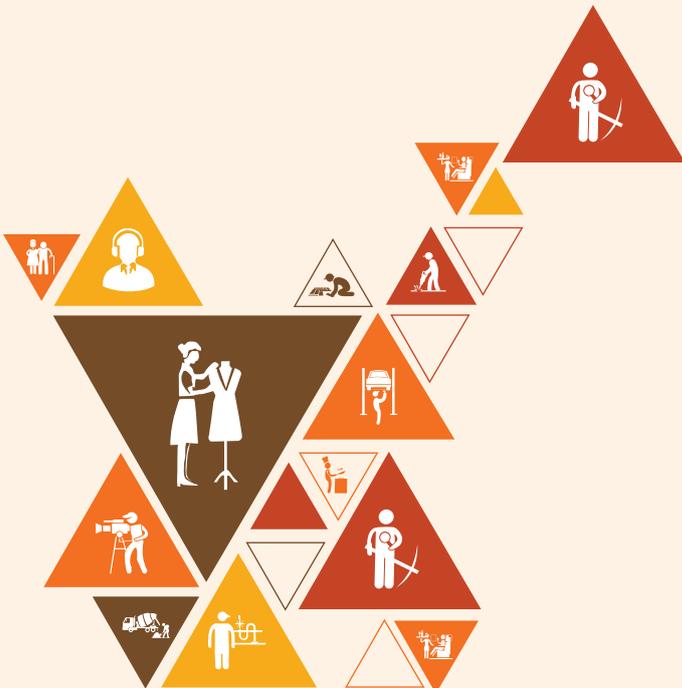


12. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - Annexure of QR Codes for Tractor
Service Mechanic



Annexure I Training Delivery Plan

Training Delivery Plan			
Program Name:	Tractor Service Mechanic		
Qualification Pack Name and Ref. ID	AGR/Q1108		
Version No.	3.0	Version Update Date	25/05/2021
Pre-requisites to Training (if any)	12th Pass with 1-year of relevant experience OR I.T.I /Diploma in relevant field from recognized body with 6 months of relevant experience OR 10th Class with 3 Year of relevant experience OR Certificate-NSQF Level 4 (Tractor Operator)		
Training Outcomes	<p>After the completion of this program, participants will be able to:</p> <ul style="list-style-type: none"> • Describe the process of preparing for the tractor's repair and maintenance • Demonstrate the process of performing routine checks on the tractor • Demonstrate the process of carrying out repair and maintenance of the tractor's transmission, hydraulic and electrical systems • Demonstrate the process of assembling various tractor engine parts and performing prestart checks • Explain the importance of practising inclusion and gender equality at the workplace • Demonstrate various practices to maintain personal hygiene, cleanliness and safety at the workplace • Demonstrate the process of carrying out repair and maintenance of mouldboard plough, disc plough, disc harrow and cultivator 		

S.No.	Module	Session	Session Objectives	NOS Reference	Methodology Tools/Aids	Training	Duration
1	Introduction and Orientation to the Role of a Tractor Service Mechanic T: 4:00 (HH:MM)	1. Orientation	<ul style="list-style-type: none"> • Recognize your fellow participants and build rapport with them • State the overall training outcomes of the programme 	NA	Team activity	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 0:30
		2. Size and scope of Agriculture in India	<ul style="list-style-type: none"> • Describe the size and scope of the agriculture industry and its sub-sectors 		Participant handbook, presentation slides, group presentations, classroom activities, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop,	T: 2:30

						internet connection (If possible)	
		3. Employment Opportunities and Sectors	<ul style="list-style-type: none"> Discuss the role and responsibilities of a Tractor Service Mechanic Identify various employment opportunities for a Tractor Service Mechanic Explain the importance of the individual's role in the workflow 		Participant handbook, presentation slides, group presentations, classroom activities, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00
2	Preparation for Carrying Out Tractor's Repair and Maintenance T: 8:00 P: 48:00 (HH:MM)	1. Tractor Designs and Functions	<ul style="list-style-type: none"> Explain the design and functions of different types of tractors Explain the basic terminology used for various tractor components and systems Identify the given tractor's manufacturer and model correctly 	AGR/ N1126 KU1, KU2, KU3, PC1	Participant handbook, presentation slides, classroom activity, discussion, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1: 00 P: 7: 00
		2. Tractor Components	<ul style="list-style-type: none"> Explain the basic terminology used for various tractor components and systems 	AGR/ N1126 KU1, KU2, KU3	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		3. Dangerous Machines Act 4. Maintenance Log 5. Basic Tools for Repair and Maintenance 6. Original Equipment Manufacturer (OEM)	<ul style="list-style-type: none"> Explain the Dangerous Machines (Regulation) Act 1983 State the importance of checking the previous repair and maintenance records List the tools and equipment required for the repair and maintenance of a tractor Explain the importance of using the manufacturer-approved tools and equipment for the 	AGR/ N1126 KU4, KU5, KU6, KU8, PC3, PC4, PC6	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), sample maintenance log	T: 5:00 P: 3:00U

			repair and maintenance of a tractor				
		7. Basic Tools for Repair and Maintenance	<ul style="list-style-type: none"> Demonstrate the correct use of the relevant tools, equipment and Personal Protective Equipment (PPE) 	AGR/N1126 KU5, KU6, KU7, KU9, PC4, PC5	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		8. Conditions for Maintenance and Repair- Part 1	<ul style="list-style-type: none"> Identify the appropriate conditions to carry out repair and maintenance of a tractor 	AGR/N1126 KU5, KU6, KU7, KU9, PC4, PC5	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 2:00 P: 6:00
		9. Conditions for Maintenance and Repair- Part 2	<ul style="list-style-type: none"> Demonstrate the activities involved in the preparation for the repair and maintenance of the tractor 	AGR/N1126 KU5, KU6, KU7, KU9, PC4, PC5	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		10. Conditions for Maintenance and Repair- Part 3	<ul style="list-style-type: none"> Demonstrate the activities involved in the preparation for the repair and maintenance of the tractor 	AGR/N1126 KU5, KU6, KU7, KU9, PC4, PC5	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
3	Routine Checks on the Tractor T: 4:00 P: 44:00	1. Pre-operational Checks for Tractors and Common	<ul style="list-style-type: none"> Describe the process of performing routine checks on a tractor Explain different systems of a tractor 	AGR/N1127 KU1, KU2, KU3, KU6, KU7, PC1,	Participant handbook, demonstration, discussion	Participant handbook, presentation slides, whiteboard,	T: 1:30 P: 6:30

(HH:MM)	Faults with Tractor Systems	<p>and common faults experienced with them</p> <ul style="list-style-type: none"> • Explain the process of identifying faults with clutch, gears, breaks, steering and various tractor implements • State the recommended level of engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel • Demonstrate the process of examining the clutch, gears, brakes and steering for correct functioning • Assess the fan belt for the prescribed level of tension • Demonstrate the process of examining the tractor implements such as harrow, rotavator, seed drills for correct functioning 	PC2, PC3, PC4, PC5, PC6	Participant handbook, field visit, discussion	markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
	2.Recommended Levels of Fluids in a Tractor	<ul style="list-style-type: none"> • State the recommended level of engine oil, hydraulic oil, transmission oil, steering box oil, coolant and fuel • Assess the engine oil, hydraulic oil, transmission oil, coolant and fuel for the prescribed levels • Evaluate the performance of temperature gauge, low oil pressure warning lamp and hour meter • Analyse the transmission, hydraulic and steering system for leakage 	AGR/ N1127 KU1, KU6, KU7, KU11, PC5, PC8, PC9, PC10		Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 2:00 P: 6:00
	3.Power Transmission System: Clutch, Brakes and Gears, Transmission System, Suspension	<ul style="list-style-type: none"> • Identify different types of breaks, electrical systems, clutches and steering systems 	AGR/ N1127 KU4, KU9, PC2, PC3, PC4, PC6		Participant handbook, presentation slides, whiteboard, markers, projectors, laptop,	

		System				internet connection (If possible)	
		4. Power Transmission System: Clutch, Brakes and Gears, Transmission, Suspension Systems- Part 1	<ul style="list-style-type: none"> Identify different types of breaks, electrical systems, clutches and steering systems 	AGR/ N1127 KU4, KU9, PU2, PC3, PC4, PC6	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		5. Power Transmission System: Clutch, Brakes and Gears, Transmission, Suspension Systems-Part 2	<ul style="list-style-type: none"> Identify different types of breaks, electrical systems, clutches and steering systems 	AGR/ N1127 KU4, KU9, PC2, PC3, PC4, PC6	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		6. Removing Air from a Diesel Fuel System and Resource Optimisation	<ul style="list-style-type: none"> Describe the process of checking for bleeding or airlocks in the fuel system 	AGR/ N1127 KU10, KU12, KU13, KU14, KU15, KU16, KU17, PC7, PC11, PC12, PC13, PC14, PC15, PC16	Participant handbook, guest lecture, demonstration, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 0:30 P: 7:30
4	Repair and Maintenance of the Engine Parts T: 8.00 P: 52:00 (HH:MM)	<ul style="list-style-type: none"> Tractor Maintenance and Safety Precautions Internal Combustion (I.C) Engines- Part 1 	<ul style="list-style-type: none"> Recap of repair and maintenance records Mention the advantages of maintaining log Explain the tractor safety guidelines Explain about I.C Engines, its working and advantages Discuss the engine terminology Explain the design and working principle of various tractor engine parts 	AGR/ N1128 KU1, KU2, KU3, PC1	Participant handbook, presentation slides, activity, discussion, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 2:00 P: 2:00

			<ul style="list-style-type: none"> Identify the type of given tractor engine, its components and working mechanism 				
		<ul style="list-style-type: none"> Internal Combustion (I.C) Engines- Part 2 	<ul style="list-style-type: none"> Explain the design and working principle of various tractor engine parts Identify the type of given tractor engine, its components and working mechanism 	AGR/N1128 PC1	Participant handbook, presentation slides, discussion, activity, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 6:00
		<ul style="list-style-type: none"> Internal Combustion (I.C) Engines- Part 3 	<ul style="list-style-type: none"> Demonstrate the use of relevant tools, equipment and PPE for dismantling the tractor engine parts 	AGR/N1128 PC1, PC2, PC3	Participant handbook, presentation slides, discussion, activity, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 6:00
		<ul style="list-style-type: none"> Critical Settings of I.C Engines-Part 1 	<ul style="list-style-type: none"> Identify various critical settings such as valve clearance, timing gears and Fuel Injection Pump (FIP) timing, etc. 	AGR/N1128 KU4, KU7, KU12, KU13, KU14, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16	Participant handbook, presentation slides, activity, discussion, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 2:00 P: 2:00
		<ul style="list-style-type: none"> Critical Settings of I.C Engines-Part 2 	<ul style="list-style-type: none"> Demonstrate the process of carrying out repair and maintenance of a diesel engine with the common rail fuel system 	AGR/N1128 KU4, KU7, KU12, KU13, KU14	Participant handbook, presentation slides, discussion, activity, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		<ul style="list-style-type: none"> Critical Settings of I.C 	<ul style="list-style-type: none"> Analyse the dismantled parts for 	AGR/N1128 PC4, PC5,	Participant handbook,	Participant handbook,	P: 8:00

		Engines-Part 3	any malfunctions, wear and tear or damage such as the water temperature gauge, sensors, thermostat, valves, crankshaft/ bearings, oil rings, etc.	PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16	presentation slides, discussion, activity, field visit	presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 2:00 P: 2:00
		• Preventive Maintenance of Tractor Parts	<ul style="list-style-type: none"> Describe the repair and maintenance procedure for different components of a tractor engine Describe the procedure for the repair and maintenance a diesel engine with the common rail fuel system 	AGR/ N1128 KU6, KU7, KU12, KU13, KU14	Participant handbook, presentation slides, activity, discussion, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		• Preventive Maintenance of Tractor Parts	<ul style="list-style-type: none"> Demonstrate the process of carrying out repair and maintenance of a diesel engine with the common rail fuel system 	AGR/ N1128 Ku6, KU7, Pc23, PC24, Pc25, PC26, Pc27, PC28, PC29, PC30, PC31	Participant handbook, presentation slides, discussion, activity, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 2:00 P: 2:00
		• Dismantling and Assembling Various Tractor Parts—Part 1	<ul style="list-style-type: none"> Describe the process of dismantling and re-assembling various tractor engine parts Demonstrate the use of relevant tools, equipment and PPE for dismantling the tractor engine parts 	AGR/ N1128 KU5, KU8, KU9, KU10, PC4, PC5, PC15, PC17, PC18, PC19, PC20, PC21, PC22	Participant handbook, presentation slides, activity, discussion, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		• Dismantling and Assembling Various Tractor Parts-Part 2	<ul style="list-style-type: none"> Demonstrate the process of carrying out repair, maintenance and replacement of various engine parts 	AGR/ N1128 Ku5, KU8, Ku9, KU10, PC4, PC5, Pc15, PC17, Pc18, PC19, Pc20, PC21, PC22	Participant handbook, presentation slides, discussion, activity, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet	

						connection (If possible), observation sheets	
5	Hydraulic System T: 8:00 P: 72:00 (HH:MM)	1. Components and Function of Hydraulic Systems	<ul style="list-style-type: none"> Explain the types and functions of hydraulic systems of a tractor Explain Pascal's law of hydraulics Identify different types of hydraulic pump, valve and cylinder 	AGR/ N1129 KU1, KU14, KU19	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 3:00 P: 3:30
		2. 3-point linkage System	<ul style="list-style-type: none"> Describe the sequence of checking a tractor's hydraulic systems Explain the working principle of the 3-point linkage system in a tractor 	AGR/ N1129 KU1, KU14, KU19, PC22, PC23	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 4:30
		3. Repair and Maintenance of Hydraulic Systems-Part 1	<ul style="list-style-type: none"> Evaluate the performance of the transmission, hydraulic and electrical systems Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Demonstrate the process of carrying out repair and maintenance of the transmission, hydraulic and electrical systems in a tractor 	AGR/ N1129 PC18, PC19, PC20, PC21, PC22, PC23	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		4. Repair and Maintenance of Hydraulic	<ul style="list-style-type: none"> Demonstrate the process of disassembling and assembling the 	AGR/ N1129 PC17	Participant handbook, field visit, discussion	Participant handbook, presentation slides,	P: 8:00

		Systems-Part 2	transmission, hydraulic and electrical systems in a tractor			whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	
		5. Components and Function of Power Transmission Systems- Differential Steering and Power-take-Off Systems	<ul style="list-style-type: none"> Explain the functioning of differential steering and power-take-off systems 	AGR/ N1129 KU4, KU7, KU8, KU9, KU10, KU11	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 1:00 P: 5:00
		6. Repair and Maintenance of Hydraulic Systems	<ul style="list-style-type: none"> Evaluate the performance of the transmission, hydraulic and electrical systems Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage 	AGR/ N1129 KU1, PU17	Participant handbook, presentation slides, classroom activity, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 1:00
		7. Components and Function of Power Transmission Systems- Brakes	<ul style="list-style-type: none"> Explain the functioning of different types of brakes and their functions 	AGR/ N1129 KU12	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet	T: 1:00 P: 2:00

						connection (If possible), observation sheets	
		8. Repair and Maintenance of Transmission Systems-Part 1	<ul style="list-style-type: none"> Evaluate the performance of the transmission, hydraulic and electrical systems Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Demonstrate the process of carrying out repair and maintenance of the transmission, hydraulic and electrical systems in a tractor 	AGR/ N1129 PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		9. Repair and Maintenance of Transmission Systems-Part 2	<ul style="list-style-type: none"> Demonstrate the process of disassembling and assembling the transmission, hydraulic and electrical systems in a tractor 	AGR/ N1129 PC1	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		10. Components and Function of Electrical System-Multi-meter and Hydrometer	<ul style="list-style-type: none"> Explain the types and functions of electrical systems of a tractor 	AGR/ N1129 KU15, KU16, KU17, KU20	Participant handbook, presentation slides, classroom activity,	Participant handbook, presentation slides, whiteboard, markers,	T: 2:00

					discussion, demonstration	projectors, laptop, internet connection (If possible), observation sheets	
		11. Working of Electrical Systems	<ul style="list-style-type: none"> Explain the types and functions of electrical systems of a tractor Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage 	AGR/ N1129 KU15, KU16, KU17, KU20, PC24, PC25, PC26	Participant handbook, presentation slides, classroom activity, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 5:00
		12. Repair and Maintenance of Electrical Systems-Part 1	<ul style="list-style-type: none"> Evaluate the performance of the transmission, hydraulic and electrical systems Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Analyse various components of the transmission, hydraulic and electrical systems such as the gearbox, rear axle, hydraulic distributor, pipes, cylinder, RPM gauge, hour meter and fuel gauge for wear and tear or damage Demonstrate the process of carrying out repair and maintenance of the transmission, hydraulic and electrical systems in a tractor 	AGR/ N1129 PC24, PC25, PC26	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		13. Repair and	<ul style="list-style-type: none"> Demonstrate the 	AGR/	Participant	Participant	P: 8:00

		Maintenance of Electrical Systems- Part 2	process of disassembling and assembling the transmission, hydraulic and electrical systems in a tractor	N1129 PC24, PC25, PC26	handbook, field visit, discussion	handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	
6	Assembly of the repaired and serviced engine parts T: 4:00 P: 20:00 (HH:MM)	1. Tractor Maintenance	<ul style="list-style-type: none"> Describe the process of assembling various tractor parts after carrying out repair and maintenance Explain the process of cleaning various components of a tractor Describe the process of performing pre-start checks Demonstrate the process of assembling various tractor parts after carrying out repair and maintenance Evaluate the tractor performance by performing the pre-start checks Demonstrate the process of carrying out repair and maintenance for the common faults identified during the pre-start checks 	AGR/ N1130 KU1, KU2, KU3, KU4, KU5, PC6, PC7, PC8, PC9, PC10, PC11, PC12	Participant handbook, activity, demonstration, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 4:00 P: 4:00
		2. Bearing Lubrication	<ul style="list-style-type: none"> Demonstrate the process of cleaning various tractor parts, shafts and bearings and applying lubricant 	AGR/ N1127 KU4, KU8, PC1, PC2, PC4	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 8:00
		3. Tyre Pressure Settings and Tyre Track Adjustments	<ul style="list-style-type: none"> Explain the importance of maintaining the correct air pressure in the tyres for various operations 	AGR/ N1127 KU6, KU7, KU9, PU3,	Participant handbook, field visit, discussion	Participant handbook, presentation slides, whiteboard, markers,	P: 8:00

			<ul style="list-style-type: none"> Explain the process of setting the draft control levers in the correct position Describe the process of fitting the cage wheel 	PU5, PC9		projectors, laptop, internet connection (If possible), observation sheets	
7	Effective Communication at the Workplace T: 4:00 P:12:00 (HH:MM)	1. Effective Communication Techniques	<ul style="list-style-type: none"> Explain the importance of verbal and non-verbal communication at the workplace Explain the effective methods of sharing and seeking information and feedback at the workplace Explain the procedure for completing work-related documentation Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD Define the need for appropriate verbal and non-verbal communication while interacting with all genders and PwD 	AGR/9918 PC1, PC2, PC3, PC4, PC5, PC6, PC7, KU1, KU2, KU3, KU4, KU6, KU7, KU8	Participant handbook, lecture, games, discussion, role play	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, tie, candle, match box, water bottle, cell phone	T: 2:00 P: 6:00
		2. Mentoring Apprentices	<ul style="list-style-type: none"> Describe the process of mentoring an apprentice at the workplace Demonstrate different approaches to mentoring an apprentice at the workplace Prepare a sample training schedule for an apprentice 	AGR/9918 PC8, PC9, PC10, PC11, PC12, PC13, KU9	Participant handbook,, lecture, panel discussion, role play	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, flowers, necessary tools and accessories for flower arrangement	T: 1:00 P: 3:00
		3. Gender	<ul style="list-style-type: none"> Explain gender 	AGR/9918	Participant	Participant	T: 1:00

		Inclusivity at Workplace	<p>concepts (gender as a social construct, gender sensitivity, gender equality etc.), issues and applicable legislation</p> <ul style="list-style-type: none"> • Explain the importance of inclusion of all genders and persons with disability at workplace • Define the need for appropriate verbal and non-verbal communication while interacting with all genders and persons with disability • Explain ways in which a conducive and inclusive working environment can be created for all genders and persons with disability 	PC14,PC15,PC16,PC17, K10, KU11, KU12, KU13, KU14,KU15, KU16, KU17	handbook, lecture, discussion, brainstorming activity	handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	P: 3:00
8	Hygiene and cleanliness T: 2:00 P: 2:00 (HH:MM)	1. Personal Health, Hygiene and Fitness at Work	<ul style="list-style-type: none"> • Explain the requirements of personal health, hygiene and fitness at work • Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs • Demonstrate how to wash worn out clothes with soap and sun-dry before use next time. • Demonstrate the steps to follow to put on and take off a mask safely 	AGR/N9903 PC1, PC2, PC3, KU5, KU6	Participant handbook, lecture, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, running water, soap and hand rubs, PPE	T: 0:30 P: 0:30
		2. Cleanliness and Safety at Workplace	<ul style="list-style-type: none"> • Describe common health-related guidelines laid down by the organisations/Government at the workplace • State the importance of sanitizing the workplace • Demonstrate how to sanitize and disinfect one's work area regularly while adhering to 	AGR/N9903 PC1, PC2, PC3, PC4, PC11, KC7	Participant handbook, lecture, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, cleaning agents,	T: 0:30 P: 0:30

			workplace sanitization norms			disinfectants and sanitizers, tools and equipment for cleaning, necessary PPE.	
		3. Housekeeping and Waste Disposal	<ul style="list-style-type: none"> Explain the importance of good housekeeping at workplace Explain safe methods of waste disposal Dispose waste safely and correctly in the designated area Explain methods to minimise environmental damage during work 	AGR/N9903 PC11, PC13, KU10, KU11, KU12	Participant handbook, lecture, group discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 0:30 P: 0:30
		4. Controlling Spread of Diseases at Workplace	<ul style="list-style-type: none"> Explain the kinds of contagious diseases in your line of work Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases Explain the measures to control spread of contagious diseases 	AGR/N9903 PC15, KU13, KU14	Participant handbook, lecture, team activity	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 0:30 P: 0:30
9	Safety and Emergency Procedures T: 2:00 P: 10:00 (HH:MM)	1. Hazards at Workplace	<ul style="list-style-type: none"> Describe the commonly reported hazards at the workplace Describe the hazards caused due to chemicals/ pesticides/ fumigants Check for hazards at workplace 	AGR/N9903 PC7, KU1, KU2, KU3, KU4	Participant handbook, lecture, game, team activity	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets	T: 0:20 P: 1:00
		2. Personal Safety at Workplace	<ul style="list-style-type: none"> List the PPE required at workplace Display the correct way of donning, doffing, and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc. 	AGR/N9903 PC3, PC6, KU8	Participant handbook, lecture, group discussion, team activity, demonstrations	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible),	T: 0:30 P: 2:00

						observation sheets, chart papers, PPE: gown, mask, gloves, googles or face shield for all	
		3. Safety While Using Tools and Equipment	<ul style="list-style-type: none"> Describe the basic safety checks to be done before the operation of any equipment/ machinery Sanitise tools, equipment, and machinery 	AGR/ N9903 PC5, PC8, PC9, PC10, KU9	Participant handbook, lecture, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, chart papers, PPE: gown, mask, gloves, googles or face shield for all	T: 0:20 P: 2:00
		4. Handling Accidents and Emergencies at Workplace	<ul style="list-style-type: none"> List some accidents, emergency situations and emergency services to use State measures that can be taken to prevent accidents and damages at the workplace Demonstrate use of emergency equipment in accordance with manufacturer's specifications and workplace requirements 	AGR/ N9903 PC12, PC15, PC16, PC17, KU14, KU16	Participant handbook, lecture, game, quiz, activity, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, chart papers, PPE: gown, mask, gloves, googles or face shield for all	T: 0:30 P: 2:00
		5. Administering First Aid	<ul style="list-style-type: none"> Describe the common first aid procedures to be followed in case of emergencies Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures Demonstrate 	AGR/ N9903 PC14, PC18, PC19, PC20, KU2, KU3, KU15, KU16, KU17	Participant handbook, lecture, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), observation sheets, chart papers, PPE:	T: 0:20 P: 3:00

			<p>administration of first aid</p> <ul style="list-style-type: none"> List some local emergency services 			gown, mask, gloves, googles or face shield for all	
10	Repair and Maintenance of Farm Implements T: 8:00 P: 48:00 (HH:MM)	1. Tillage Machinery	<ul style="list-style-type: none"> Explain the design and functions of primary and secondary tillage machinery Understand the necessary safety measures while operating the tillage machinery 	AGR/N1119 KU1, KU2, KU8, KU10	Participant handbook, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible), flower pots, trowel, seeds/sapling, water	T: 1:00
		2. Ploughing	<ul style="list-style-type: none"> Explain the ploughing based on field coverage Explain the methods of ploughing 	AGR/N1119 KU1, KU2, KU8, KU10	Participant handbook, discussion, demonstration, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00 P: 4:00
		3. Tillage Implements- Part 1	<ul style="list-style-type: none"> Explain the design and functions of primary and secondary tillage machinery 	AGR/N1119 KU3	Participant handbook, discussion	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00
		4. Tillage Implements- Part 2	<ul style="list-style-type: none"> Explain the design and functions of primary and secondary tillage machinery 	AGR/N1119 KU2, KU3	Participant handbook, discussion, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	P: 8:00
		5. Disc Harrow—Adjustment, Operations and	<ul style="list-style-type: none"> Identify various components of a disc harrow Explain the common repair and maintenance needs 	AGR/N1119 KU1, KU4, KU8,	Participant handbook, discussion, demonstration	Participant handbook, presentation slides, whiteboard,	T: 1:00 P: 2:00

	Maintenance-Part 1	<p>of the disc harrow</p> <ul style="list-style-type: none"> • Explain the necessary safety measures to be undertaken while operating the tillage machinery 	KU9, KU10, KU11		markers, projectors, laptop, internet connection (If possible)	
	6. Disc Harrow-Adjustment, Operations and Maintenance-Part 2	<ul style="list-style-type: none"> • Demonstrate the process of checking the disc harrow and their components for correct functioning, wear and tear or damage • Analyse the joints, nuts, bolts and pins for locking and the prescribed torque 	AGR/N1119 Pc16, PC17, PC18, PC19, PC20, PC21, PC22, PC24, PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33	Participant handbook, discussion, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	P: 6:00
	7. Disc Plough-Adjustment, Operations and Maintenance-Part 1	<ul style="list-style-type: none"> • Identify various components of a disc plough • Explain the common repair and maintenance needs of the plough • Explain the necessary safety measures to be undertaken while operating the tillage machinery 	AGR/N1119 KU1, KU4, KU8, KU9, KU10, KU11	Participant handbook, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00 P: 2:00
	8. Disc Plough-Adjustment, Operations and Maintenance-Part 2	<ul style="list-style-type: none"> • Demonstrate the process of checking the disc plough and their components for correct functioning, wear and tear or damage 	AGR/N1119 PC8,PC9,PC10,PC11,PC12,PC13,PC14,PC15	Participant handbook, discussion, demonstration, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	P: 6:00
	9. Mould Plough—Adjustment, Operations and Maintenance—Part 1	<ul style="list-style-type: none"> • Identify various components of a mould board plough • Explain the common repair and maintenance needs of the mould board plough • Explain the necessary safety measures to be undertaken while operating the tillage machinery • Understand the process of adjusting the gauge and wheel disc, tilt angle and working depth of the mould board plough 	AGR/N1119 KU3, KU4, KU9, KU11	Participant handbook, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00 P: 2:00

		10. Mould Plough-Adjustment, Operations and Maintenance-Part 2	<ul style="list-style-type: none"> • Demonstrate the process of checking the mould board plough and their components for correct functioning, wear and tear or damage • Demonstrate the process of making various adjustments such as correcting the level of plough, horizontal and vertical suction, level of the cultivator to ensure all the shovels touch the ground, etc. 	AGR/ N1119 PC1, PC2, PC3, PC4, PC5, PC6, PC7	Participant handbook, discussion, demonstration, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	P: 6:00
		11. Adjustment and Maintenance of Seeding and Planting Equipment	<ul style="list-style-type: none"> • Explain the common adjustment and maintenance needs of the seeding and planting equipment 	AGR/ N1119	Participant handbook, discussion, demonstration	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00 P: 4:00
		12. Welding on Broken Joints-Part 1	<ul style="list-style-type: none"> • Demonstrate the process of carrying out welding on broken joints 	AGR/ N1119 KU5, KU6, KU7, KU10, PC23	Participant handbook, discussion, guest lecture	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	T: 1:00 P: 4:00
		13. Welding on Broken Joints-Part 2	<ul style="list-style-type: none"> • Demonstrate the process of carrying out welding on broken joints 	AGR/ N1119 PC23	Participant handbook, discussion, field visit	Participant handbook, presentation slides, whiteboard, markers, projectors, laptop, internet connection (If possible)	P: 4:00

11.	Employability Skills (60hrs)	Introduction to Employability Skills	<ul style="list-style-type: none"> Describe importance of Employability Skills Prepare a note on different industries, trends, required skills 	DGT/VS Q/ N0102	Classroom lecture, Team Activity	White-Board, Markers, Chart Paper and Sketch pens, LCD Projector	1:30
		Constitutional Values: Citizenship	<ul style="list-style-type: none"> Detail the principles of constitution of India Identify the various environmentally sustainable practices 		Classroom lecture, Team Activity	Laptop, PPT, White board Markers, note pad, pen etc.	1:30
		Becoming a Professional in the 21st Century	<ul style="list-style-type: none"> Discuss relevant 21st century skills required for employment Practice critical thinking and decision making skills 		Classroom lecture, Team Activity	Laptop, PPT, White board Markers, note pad, pen etc.	2:30
		Basic Skills-I	<ul style="list-style-type: none"> Read English text with appropriate articulation Practice basic English words, sentences, punctuation Demonstrate active listening and reading skills 		Classroom lecture, Team Activity, Role play, video session	Laptop, PPT, White board Markers, note pad, pen etc.	5:00
		Basic Skills-II		Practical, demonstration, role play	5:00		
		Career Development and Goal Setting	<ul style="list-style-type: none"> Identify well-defined short- and long-term goals Explain how to build a career pathway Conduct job market 	DGT/V SQ /N0102	Class room lecture, discussion, demonstration, practical	Laptop, PPT, White board Markers, note pad, pen etc.	2:00

			<ul style="list-style-type: none"> research Discuss how to set career goals. 				
	Communication Skills		<ul style="list-style-type: none"> Explain the importance of communication at workplace Demonstrate effective communication strategies Demonstrate how to communicate effectively using verbal and nonverbal communication 	DGT/V SQ /N010 2	Class room lecture, discussion, demonstration, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
	Diversity and Inclusion		<ul style="list-style-type: none"> Explain the need of diversity at workplace Identify the various PwD policies applicable at workplace Discuss the significance of the POSH Act 	DGT/V SQ/ N0102	Class room lecture, Inter-active discussion	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	2:30
	Financial and Legal Literacy		<ul style="list-style-type: none"> Discuss various financial institutions, products, and services Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions 	DGT/V SQ/ N0102	Class room lecture, demonstrations, group discussion, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
	Essential Digital Skills-I		<ul style="list-style-type: none"> Detail the use and features of various MS Office tools, like MS Word, MS Excel, MS PowerPoint, etc. Demonstrate how to operate digital devices Create an e-mail id and follow e-mail etiquette to exchange e-mails Describe the role of digital technology in day-to-day life and the workplace 	DGT/V SQ/ N0102	Class room lecture, discussion, Demonstration, practical, learning by doing	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	6:00
	Essential Digital Skills-II		<ul style="list-style-type: none"> Practice Digital skills 		Demonstration, practical, learning		4:00

				by doing			
		Entrepreneurship	<ul style="list-style-type: none"> Describe the types of entrepreneurship and enterprises Describe the 4Ps Of Marketing- Product, Price, Place and Promotion and Apply the mas Per requirement Create a sample Business plan, For the selected business 	DGT/VSQ /N0102	Class room lecture, discussion, Demonstration, practical	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	7:00
		Customer Service	<ul style="list-style-type: none"> Identify types of customers and how to deal with them Identify methods to get customer feedback and how to implement them Explain various tools used to collect customer feedback Discuss the significance of maintaining hygiene and dressing appropriately 	DGT/ VSQ/N 0102	Class room lecture, activity, role play, video session	Laptop, PPT, White board Markers, note pad, pen, audio visual aids etc.	5:00
		Apprenticeships and Jobs	<ul style="list-style-type: none"> Practice personal grooming strategies Illustrate the use of online platforms for job hunting Detail the concept of Apprenticeship Demonstrate how to enroll for Apprenticeship programs. Draft a professional Curriculum Vitae (CV) Role play a mock interview 	DGT/ VSQ/N 0102			8:00

Annexure - II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

(For Updated 'Assessment Criteria', please refer to Qualification Pack of this Job role available at <https://www.nqr.gov.in/>)

Assessment Criteria for ASCI—Tractor Service Mechanic	
Job Role	Tractor Service Mechanic
Qualification Pack	AGR/Q1108
Sector Skill Council	Agriculture Skill Council of India

Sl No.	Guidelines for Assessment
1.	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Assessment will be conducted for all compulsory NOS, as well as the selected elective NOS/set of NOS.
4.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center (as per assessment criteria below).
6.	To pass the Qualification Pack, every trainee should score a minimum of 50% of aggregate marks to successfully clear the assessment.
7.	In case of <i>unsuccessful completion</i> , the trainee may seek reassessment on the Qualification Pack.

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N1126. Prepare for carrying out tractor's repair and maintenance	30	40	-	30	100	15
AGR/N1127. Perform routine checks on the tractor	30	40	-	30	100	15
AGR/N1128. Carry out maintenance and repair of engine parts	30	40	-	30	100	20
AGR/N1129. Carry out maintenance and repair of transmission, hydraulic and electrical systems	35	40	-	25	100	15
AGR/N1130. Assemble the repaired and serviced parts	30	40	-	30	100	15
AGR/N9918. Communicate effectively at the workplace	60	46	-	44	150	5
AGR/N9903. Maintain health and safety at the workplace	40	25	-	35	100	15
Total	255	271	-	224	750	100

Optional: 1 Repair and maintenance of farm implements

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N1119. Carry out repair and maintenance of tillage and soil farming equipment	30	40	-	30	100	15
Total	30	40	0	30	100	15

Annexure - III

Annexure of QR Codes for Tractor Service Mechanic

Module No.	Unit No.	Topic	QR Code Links	QR Code
1. Introduction and orientation to the role of a tractor service mechanic	Unit 1.1: Size and Scope of agriculture industry in india	Agriculture first	https://www.youtube.com/watch?v=Fy6QVKri-pU	 Agriculture first
2. Preparation for carrying out tractor's repair and maintenance	Unit 2.1: Tractor designs and functions	Types of tractors	https://www.youtube.com/watch?v=4EHjHcyB9yY	 Types of tractors
3. Routine checks on the tractor	Unit 3.1: Pre-operational checks for tractors	Common tractor maintenance checkpoints	https://www.youtube.com/watch?v=BfWylXHK1yg	 Common tractor maintenance checkpoints
	Unit 3.4: Power transmission system: clutch	Transmission system in automobile	https://www.youtube.com/watch?v=T7es2m7tf_A	 Transmission system in automobile
	Unit 3.6: Power transmission system: transmission system	How a differential works?	https://www.youtube.com/watch?v=lq0jaMOFYnc	 How a differential works?
	Unit 3.7: Power transmission system: suspension system	How a suspension system works in automobile	https://www.youtube.com/watch?v=APJ9bctVt38	 How a suspension system works in automobile
	Unit 3.8: Removing air from a diesel fuel system	Best way to remove diesel fuel system	https://www.youtube.com/watch?v=dfIMxYDOPns	 Best way to remove diesel fuel system

4. Repair and maintenance of the engine parts	Unit 4.1: Tractor maintenance and safety precautions	Personal and occupational safety precautions	https://www.youtube.com/watch?v=QI6mOu9OB3k	 Personal and occupational safety precautions
	Unit 4.2: Internal combustion (I.C) engines	Working of an internal combustion engine	https://www.youtube.com/watch?v=vIJ50aUiBgM	 Working of an internal combustion engine
	Unit 4.3: Critical settings of I.C engines	Fuel timing setting —spill cut-off method	https://www.youtube.com/watch?v=IWocP-N1DLU	 Fuel timing setting —spill cut-off method
6. Assembly of the repaired and serviced engine parts	Unit 6.2: Bearing lubrication	Why bearings fail?	https://youtu.be/FdGIKbQHofM	 Why bearings fail?
	Unit 6.3: Tyre pressure settings	Correct tractor tyre pressure	https://youtu.be/nyvN7O2lgGQ	 Correct tractor tyre pressure
	Unit 6.4: Tyre track adjustments	Tractor wheel alignment	https://youtu.be/DNacW2IF6QM	 Tractor wheel alignment

9. Safety and emergency procedures	Unit 9.5: Administering first aid	First aid for burns	https://www.youtube.com/watch?v=yfoLgUxh474	 First aid for burns
		What is HIRA (Hazard identification and risk assessment)?	https://www.youtube.com/watch?v=spgAeV9wPFo	 What is HIRA (Hazard Identification and Risk Assessment)?
		How to use the fire extinguisher	https://www.youtube.com/watch?v=6mX07wNJUYE	 How to use the fire extinguisher
		Pollinators & pesticides from the ground Up	https://www.youtube.com/watch?v=hk3PU5qyYQ	 Pollinators & Pesticides From the Ground Up



Skill India

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