



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

Power Tiller – Special Features

Lecture Notes

Introduction to Power Tillers

Definition:

A power tiller is a walking-type agricultural tractor used primarily for tilling soil. It is a versatile, lightweight machine operated by a single person and suitable for small-scale farming.

Applications:

- Primary and secondary tillage
- Sowing and planting
- Puddling and weeding
- Haulage of farm produce

Advantages:

- Affordable for small farmers
- Low fuel consumption
- Easy manoeuvrability
- Suitable for wetland paddy cultivation

Basic Components:

- Internal combustion engine
- Transmission system (clutch, gearbox, differential)



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

- Rotary tiller blades
- Handlebar for control

Special Features Overview

Special features make power tillers highly adaptable to diverse terrains and farming operations. Key specialized systems include:

1. **Clutch system** – Engages/disengages the engine from the drive.
2. **Gearbox** – Varies speed and torque for different operations.
3. **Steering system** – Offers precise directional control.
4. **Brake system** – Assures safety and aids in steering.

Each of these components is engineered for high efficiency, rugged field conditions, and ease of use by farmers.

Clutch – Construction and Function

Function of Clutch:

- Connects and disconnects engine power from the transmission.
- Allows gear changes without damaging the transmission.
- Ensures smooth start/stop operations.

Types Used:



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

- **Wet multi-plate clutch** is most common.
 - Lubricated by oil → less wear and smoother operation.
 - Compact design suitable for compact machines.

Key Components:

- Clutch plates (friction plates and steel plates)
- Pressure plate
- Clutch hub and spring

Materials:

- Friction plates made of asbestos or ceramic composites.

Clutch – Operational Details and Advantages

Working Principle:

- When the clutch lever is released, springs press the plates together → power transmission begins.
- When the lever is pulled, plates separate → power transmission stops.

Special Features:

- **Durability:** Withstands frequent engagement and high torque loads.
- **Compactness:** Fits within the limited space of tiller chassis.
- **Ease of maintenance:** Parts are modular and replaceable.



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

Common Issues:

- Plate wear
- Oil contamination in friction plates (if seals leak)

Gearbox – Function and Layout

Function:

- Converts engine speed into appropriate wheel/tiller speed.
- Allows different gear ratios for different tasks (tilling, transport, etc.).

Types:

- **Manual sliding mesh gearbox** (commonly used)
- Includes **3–6 forward gears, 1–2 reverse gears**

Gear Layout:

- Gears mounted on shafts in housing
- Gear selector mechanism moves sliding gears into mesh

Special Gears:

- Low gears → high torque for heavy tillage
- High gears → faster transport

Gearbox – Features and Benefits



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

Special Features:

- **High torque multiplication:** Ideal for heavy-duty tilling in hard soils.
- **Compact design:** Tailored to the limited power and space of tillers.
- **Oil lubrication:** Reduces friction and wear.

Design Aspects:

- Gearbox casing made from cast iron/aluminium for durability.
- Sealed housing to prevent dust/water ingress.

Maintenance Tips:

- Regular oil checks
- Avoid shifting under load to prevent gear damage

Steering System – Mechanism and Design

Function:

- Controls movement direction.
- Essential in wet fields and tight turns.

Types:

- **Handlebar steering** (basic)
- **Differential steering using individual brakes** (advanced)

Steering Method:



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

- Operator pushes/pulls handlebars.
- To turn: Apply brake to one wheel → creates pivot action.

Steering Clutch (if present):

- Allows one wheel to rotate slower than the other.

Steering – Features and Efficiency

Special Features:

- **Tight turning radius:** Enables manoeuvring in small plots.
- **Low effort design:** Requires minimal operator strength.
- **Independent wheel control:** Used for both steering and braking.

Operator Ergonomics:

- Adjustable handlebars
- Vibration dampers to reduce fatigue

Common Challenges:

- Difficulty in very muddy fields
- Fatigue in prolonged use without power steering

Brake System – Types and Importance

Function:



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

- Stops motion of the tiller.
- Assists in steering.

Types:

- **Mechanical drum brakes** (most common)
- **Disc brakes** in advanced models

Independent Braking:

- Left and right wheel brakes operated separately.
- Braking one wheel turns tiller in that direction.

Components:

- Brake shoe and drum/disc
- Brake cable and lever

Brake System – Features and Maintenance

Special Features:

- **Dual function:** Acts as both brake and steering tool.
- **Water/mud protection:** Sealed system avoids ingress.
- **Durability:** Designed to work in dusty, wet, and rugged conditions.

Maintenance:

- Regular check for brake shoe wear



SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai

Accredited by NAAC-UGC with 'A++' Grade (Cycle III) &

Accredited by NBA (B.E CSE, EEE, ECE, Mech & B.Tech.IT)

COIMBATORE-641 035, TAMIL NADU

- Ensure levers/cables are properly tensioned
- Replace oil seals to avoid brake contamination

Safety Tips:

- Always test brakes before use.
- Avoid using both brakes simultaneously at high speed