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DEPARTMENT OF AGRICULTURAL ENGINEERING

AI3501 FARM EQUIPMENT AND MACHINERY

TWO MARK QUESTIONS AND ANSWERS

UNIT I FARM MECHANIZATION

1. What is Farm Mechanization?

Farm mechanization is the use of machinery and technology in farming activities to enhance efficiency, productivity, and reduce labour.

2. What are the Objectives of Farm Mechanization?

Objectives include increasing agricultural productivity, reducing labor requirements, minimizing drudgery, and improving the timeliness of farm operations.

3. Define Tillage.

Tillage is the mechanical manipulation of soil to create suitable conditions for crop establishment, growth, and yield.

4. What are the Objectives of Tillage?

Objectives of tillage include soil loosening, weed control, incorporation of organic matter, and preparation of the seedbed.

5. What are the Methods of Tillage?

Methods of tillage include conventional tillage, minimum tillage, and zero tillage, each aimed at specific soil and crop requirements.

6. What is Primary Tillage?

Primary tillage is the initial, deep cutting of soil to break and loosen it, usually done using implements like a moldboard plough or chisel plough.

7. Name Two Primary Tillage Implements.

Two primary tillage implements are the moldboard plough and disc plough.

8. What is Secondary Tillage?

Secondary tillage refers to shallower soil manipulation following primary tillage to refine the soil, destroy weeds, and create a fine seedbed.

9. Name Two Secondary Tillage Implements.

Two secondary tillage implements are the harrow and cultivator.

10. What is an Animal Drawn Plough?

An animal-drawn plough is a traditional tillage tool pulled by animals like oxen, used to turn and prepare soil for planting.

11. Write the Construction of an Animal Drawn Plough.

An animal-drawn plough consists of a wooden or metal beam, a handle, and a share (the part that cuts the soil), with a yoke to attach to the animals.

12. What are Trailed Farm Implements?

Trailed farm implements are those that are pulled by tractors but do not have a direct hydraulic connection, such as trailers and harrows.

13. What are Mounted Farm Implements?

Mounted farm implements are directly attached to the tractor's three-point linkage, allowing better control and maneuverability, like mounted ploughs and seed drills.

14. Define Field Capacity.

Field capacity is the area of land a piece of machinery can effectively cover per unit time, including the effect of field efficiency and working width.

15. What are the Forces Acting on a Tillage Tool?

The forces acting on a tillage tool include draft (horizontal pull), vertical force (due to tool weight), and soil resistance.

16. What is Draft Force in Tillage?

Draft force is the horizontal force required to pull a tillage implement through the soil, depending on soil type, tool design, and operating conditions.

17. Explain the Purpose of Primary Tillage.

The purpose of primary tillage is to break the compact soil, improve aeration, and make it suitable for planting by loosening and mixing.

18. What is Minimum Tillage?

Minimum tillage is a conservation technique that reduces the number of tillage operations, aiming to minimize soil disturbance and maintain soil structure.

19. What are the Advantages of Zero Tillage?

Advantages of zero tillage include reduced soil erosion, improved water retention, reduced labour, and lower fuel consumption.

20. Name Two Implements Used for Secondary Tillage.

Two implements used for secondary tillage are the disc harrow and rotary tiller.

21. What is a Harrow Used For?

A harrow is used for breaking up soil clods, levelling the soil surface, and killing weeds after primary tillage.

22. Explain the Function of a Cultivator.

A cultivator is used to stir and pulverize the soil, either before planting to aerate the soil and prepare a smooth seedbed or after planting to kill weeds.

23. What is the Purpose of a Chisel Plough?

A chisel plough is used for deep tillage to break up compacted soil layers, improve water infiltration, and promote root growth.

24. What is the Difference Between Trailed and Mounted Implements?

Trailed implements are pulled by tractors without a hydraulic linkage, while mounted implements are directly attached to the tractor's three-point linkage for greater control.

25. How Does Field Capacity Affect Farm Efficiency?

Higher field capacity implies that more land can be covered in a shorter period, leading to greater efficiency and reduced operational costs.

UNIT II PRIMARY AND SECONDARY TILLAGE IMPLEMENTS

1. What is a Mould Board Plough?

A mould board plough is a primary tillage implement used to turn over and break the soil, creating a furrow for planting.

2. Name Two Attachments Used with Mould Board Plough.

Two attachments used with a mould board plough are the jointer and the coulter, which help in cutting the soil and crop residues.

3. What are the Shapes of Mould Boards?

The shapes of mould boards include the general-purpose, stubble, and slatted mould boards, each designed for different soil types and conditions.

4. What is a General-Purpose Mould Board?

A general-purpose mould board is used for a variety of soil conditions and can turn and break soil efficiently with moderate power requirements.

5. Define a Disc Plough.

A disc plough is a type of plough that uses concave discs to cut and turn the soil, suitable for hard, dry, or trashy soil conditions.

6. What Forces Act on a Disc Plough?

Forces acting on a disc plough include draft force (pulling force), soil resistance, and weight acting vertically downward.

7. What are the Types of Disc Ploughs?

Types of disc ploughs include standard disc ploughs and offset disc ploughs, depending on the arrangement and purpose of the discs.

8. What is a Subsoiler Plough?

A subsoiler plough is a deep tillage implement designed to break up compacted soil layers below the surface, promoting water infiltration and root growth.

9. What is the Purpose of a Rotary Plough?

A rotary plough uses rotating blades to break and mix soil, providing fine tillage and suitable seedbed preparation.

10. What are Cultivators Used For?

Cultivators are used for soil stirring, aeration, and weed control, either before or after planting.

11. What are the Types of Cultivators?

Types of cultivators include spring tine cultivators and rigid tine cultivators, differentiated by their tine structure and flexibility.

12. Write the Construction of a Rigid Tine Cultivator.

A rigid tine cultivator consists of strong tines that do not flex, mounted on a frame, used for breaking hard soils and uprooting weeds.

13. What is a Disc Harrow?

A disc harrow is a secondary tillage implement used to break clods, level the soil, and incorporate crop residues into the soil.

14. What is a Bund Former?

A bund former is used to create raised bunds or embankments in fields, especially in irrigation systems, to control water flow.

15. What is a Ridger Used For?

A ridger is used to create ridges in the soil for planting crops like potatoes, or for making furrows for irrigation.

16. What is the Function of a Leveller?

A leveller is used to smooth and level the soil surface after ploughing, improving field conditions for planting.

17. Define a Basin Lister.

A basin lister is an implement used to create basins or small depressions in the soil, which help in water retention and reduce soil erosion.

18. What is Wetland Preparation Implements?

Wetland preparation implements are tools designed to work in waterlogged or flooded conditions, such as puddler and cage wheel, to prepare paddy fields.

19. What is the Function of a Puddler?

A puddler is used for wetland preparation to break soil clods, mix water and soil, and create a fine mud suitable for rice transplanting.

20. What is a Cage Wheel Used For?

A cage wheel is attached to tractors in wetland areas to provide better traction and prevent the tractor from sinking in soft, waterlogged fields.

21. How Does a Mould Board Help in Tillage?

The mould board turns over the soil, burying weeds and crop residues, which helps in preparing a clean seedbed for planting.

22. What is an Offset Disc Plough?

An offset disc plough has discs arranged in two gangs with an offset design, allowing effective ploughing without a central furrow.

23. What is the Purpose of a Joiner on a Mould Board Plough?

A jointer is a small plough attachment that helps cut and turn a strip of soil ahead of the main mould board, improving the ploughing efficiency.

24. Describe the Construction of a Rotary Plough.

A rotary plough has a rotating shaft with multiple blades attached, powered by a PTO, which cuts and pulverizes the soil into small particles.

25. What are the Benefits of Using a Subsoiler Plough?

The benefits of using a subsoiler plough include breaking hardpan layers, improving soil drainage, and promoting deep root growth for crops.

UNIT III SOWING AND FERTILIZING EQUIPMENT

1. What is Crop Planting?

Crop planting is the process of placing seeds or seedlings in the soil to establish a new crop for growth and yield.

2. Name Two Methods of Crop Planting.

Two methods of crop planting are direct seeding and transplanting.

3. What is a Row Crop Planting System?

A row crop planting system involves planting seeds in rows, allowing for easier management, cultivation, and harvesting of crops.

4. What are Seed Metering Devices?

Seed metering devices are mechanisms used in seed drills and planters to ensure accurate and uniform distribution of seeds in the soil.

5. Define Furrow Openers.

Furrow openers are tools attached to seed drills and planters that create furrows in the soil for placing seeds at the correct depth.

6. What are Furrow Closers?

Furrow closers are devices that cover the seeds after planting, ensuring good soil-to-seed contact for optimal germination.

7. Name Two Types of Furrow Openers.

Two types of furrow openers are the shovel type and the disc type.

8. What is the Function of a Shovel Furrow Opener?

A shovel furrow opener creates a V-shaped furrow in the soil, suitable for various soil types.

9. What is the Purpose of a Disc Furrow Opener?

A disc furrow opener uses a circular disc to cut through soil and create furrows, effective in tough or trashy soil conditions.

10. What are Seed Drills?

Seed drills are agricultural implements used to plant seeds in a precise and controlled manner, ensuring uniform spacing and depth.

11. Name Two Types of Seed Drills.

Two types of seed drills are conventional seed drills and air seeders.

12. What is a Seed Planter?

A seed planter is a device designed for sowing seeds, typically with features for metering, furrowing, and covering seeds.

13. What is Calibration in Seed Drills?

Calibration is the process of adjusting seed drills to ensure the correct amount of seed is sown per unit area, promoting optimal plant density.

14. What are Fertilizer Metering Devices?

Fertilizer metering devices control the amount of fertilizer applied to the soil, ensuring even distribution and effective nutrient delivery.

15. What is a Seed Cum Fertilizer Drill?

A seed cum fertilizer drill is a type of implement that simultaneously sows seeds and applies fertilizers in one operation.

16. What is the Purpose of a Paddy Transplanter?

A paddy transplanter is used to transplant rice seedlings from nurseries to paddy fields, enhancing planting efficiency and reducing labour.

17. What are Nursery Tray Machines?

Nursery tray machines are equipment used to prepare and fill trays with soil for raising seedlings before transplanting them to the field.

18. How Does a Seed Drill Improve Planting Efficiency?

A seed drill improves planting efficiency by ensuring uniform seed placement and reducing seed wastage compared to traditional broadcasting methods.

19. What is the Role of a Fertilizer Applicator?

A fertilizer applicator distributes fertilizers at specified rates and intervals, promoting better crop growth and yield.

20. What is the Function of an Air Seeder?

An air seeder uses air pressure to transport seeds and fertilizers to the furrow openers, allowing for precise and efficient planting.

21. How Do Furrow Closers Help in Crop Establishment?

Furrow closers help in crop establishment by ensuring proper soil coverage over seeds, enhancing germination rates and protecting them from adverse conditions.

22. What are the Advantages of Direct Seeding?

Advantages of direct seeding include reduced soil disturbance, lower labour costs, and improved moisture retention in the soil.

23. What Factors Should Be Considered for Seed Drill Calibration?

Factors include seed size, desired planting depth, soil type, and row spacing.

24. What is the Benefit of Using a Seed Cum Fertilizer Drill?

The benefit of using a seed cum fertilizer drill is the efficiency of performing two operations simultaneously, saving time and labour.

25. What is the Importance of Uniform Seed Distribution?

Uniform seed distribution is crucial for ensuring consistent crop growth, minimizing competition among plants, and optimizing yield potential.

UNIT IV WEEDING AND PLANT PROTECTION EQUIPMENT

1. What is Weeding Equipment?

Weeding equipment includes tools and machinery designed to remove weeds from agricultural fields, promoting healthy crop growth.

2. What is a Hand Hoe?

A hand hoe is a simple tool with a flat blade attached to a long handle, used for manually removing weeds and loosening soil around plants.

3. What are Long Handled Weeding Tools?

Long-handled weeding tools are implements designed for weed removal without bending, reducing strain on the back and improving efficiency.

4. What is a Dryland Star Weeder?

A dryland star weeder is a tool used in dryland farming to effectively uproot weeds and aerate the soil without damaging crop roots.

5. What is a Wetland Conoweeder?

A wetland conoweeder is a weeding tool specifically designed for flooded conditions, allowing for effective weed management in rice paddies.

6. What is a Rotary Weeder?

A rotary weeder is a powered weeding implement that uses rotating blades to cut and uproot weeds in a field.

7. What is Engine-Operated Weeders?

Engine-operated weeders are powered machines that utilize an engine to drive mechanical weeding operations, increasing efficiency and reducing labour.

8. What are Tractor Weeders?

Tractor weeders are implements attached to tractors for large-scale weeding operations, enhancing productivity and reducing manual labour.

9. What are the Types of Sprayers?

Types of sprayers include hand-held sprayers, backpack sprayers, tractor-mounted sprayers, and aerial sprayers.

10. What is the Classification of Sprayers?

Sprayers can be classified into hydraulic sprayers, air blast sprayers, and electrostatic sprayers, based on their operation and application methods.

11. Define Atomization in Spraying.

Atomization is the process of breaking liquid into fine droplets to ensure effective distribution and coverage when applying pesticides or fertilizers.

12. What is Spray Application Rate?

Spray application rate is the volume of liquid applied per unit area, usually expressed in liters per hectare (L/ha).

13. What is Droplet Size Determination?

Droplet size determination refers to measuring the size of droplets produced during spraying, which affects coverage, penetration, and drift.

14. What is Volume Median Diameter (VMD)?

Volume median diameter (VMD) is the droplet size at which 50% of the spray volume is contained in droplets smaller than this size.

15. What is Numerical Median Diameter?

Numerical median diameter is the droplet size at which half of the total number of droplets are smaller and half are larger.

16. What is Drift Control in Spraying?

Drift control refers to techniques and measures taken to minimize the movement of spray droplets away from the target area, reducing pesticide loss and environmental impact.

17. How Does a Hand Hoe Work?

A hand hoe works by using the cutting edge of the blade to slice through weeds at the soil surface and uproot them.

18. What is the Advantage of Using Long Handled Weeding Tools?

The advantage of using long-handled weeding tools is that they allow users to weed without bending, reducing physical strain and fatigue.

19. Write the Working Principle of a Rotary Weeder.

A rotary weeder operates by using rotating blades or tines to cut and dislodge weeds from the soil surface as it is pushed or pulled through the field.

20. What is the Role of Sprayers in Agriculture?

Sprayers play a crucial role in agriculture by enabling efficient and uniform application of pesticides, herbicides, and fertilizers to crops.

21. What Factors Influence Spray Application Rate?

Factors influencing spray application rate include nozzle size, pressure, speed of application, and crop type.

22. How Does Atomization Affect Pesticide Efficacy?

Proper atomization ensures that pesticide droplets are small enough to penetrate the crop canopy while providing uniform coverage for effective pest control.

23. What is the Impact of Droplet Size on Drift?

Smaller droplets are more susceptible to drift caused by wind, while larger droplets tend to settle quickly and minimize drift.

24. What Techniques Are Used for Drift Control?

Techniques for drift control include using larger droplets, selecting appropriate nozzle types, adjusting spray height, and applying during favorable weather conditions.

25. What is the Importance of Calibration in Spraying Equipment?

Calibration is essential to ensure accurate spray application rates, improve efficacy, and prevent overuse of chemicals, which can harm the environment and crops.

UNIT V HARVESTING MACHINERY

1. What are the Principles of Cutting Crops?

The principles of cutting crops involve using mechanical forces to sever the plant stems at the base, minimizing damage to the remaining plant structure and ensuring efficient harvesting.

2. Name Two Types of Harvesting Machinery.

Two types of harvesting machinery are reapers and combine harvesters.

3. What is a Vertical Conveyor Reaper?

A vertical conveyor reaper is a harvesting machine that uses vertical blades to cut crops and conveyor belts to lift and transport the cut material for collection.

4. Define a Binder Combine Harvester.

A binder combine harvester cuts and binds crops into bundles while simultaneously preparing them for transport, effectively integrating cutting and bundling processes.

5. What is the Function of a Baler?

A baler compresses cut and gathered crop material, such as hay or straw, into bales for easier handling, storage, and transportation.

6. What are Threshers Used For?

Threshers are machines that separate grain from the chaff and stalks after harvesting, increasing the efficiency of grain collection.

7. What is a Tractor-Mounted Combine Harvester?

A tractor-mounted combine harvester is a harvesting machine attached to a tractor, combining the functions of cutting, threshing, and cleaning in a single operation.

8. What are Combine Losses?

Combine losses refer to the amount of grain that is lost during the harvesting process, including losses from cutting, threshing, and grain separation.

9. What are the Advantages of Using Combine Harvesters?

Advantages include increased efficiency, reduced labor costs, and the ability to perform multiple operations (cutting, threshing, and cleaning) in a single pass.

10. What is the Role of the Cutting Bar in a Combine Harvester?

The cutting bar is the component that slices through the crop, allowing for efficient cutting and feeding of the harvested material into the machine.

11. How Do Balers Work?

Balers pick up cut crop material, compress it into bales, and then wrap or tie the bales for easy handling and transport.

12. What are the Different Types of Threshers?

Different types of threshers include axial flow, drum-type, and vibrating threshers, each designed for specific crops and harvesting conditions.

13. What is the Purpose of the Separator in a Combine Harvester?

The separator in a combine harvester separates the grain from the straw and chaff after threshing, ensuring clean grain collection.

14. How Do Vertical Conveyor Reapers Improve Efficiency?

Vertical conveyor reapers improve efficiency by elevating cut crop material, reducing the need for manual labour in gathering and transporting it.

15. What is the Importance of Adjusting Harvesting Machinery?

Adjusting harvesting machinery is crucial for optimizing performance, reducing crop losses, and adapting to varying field conditions and crop types.

16. What Factors Contribute to Combine Losses?

Factors contributing to combine losses include improper machine settings, crop type, field conditions, and operator experience.

17. What is a Reel in a Combine Harvester?

A reel is a rotating device that helps guide and lift the crop into the cutting mechanism of the combine harvester.

18. What is the Role of the Feed Auger in a Combine Harvester?

The feed auger transports cut crop material from the cutting bar to the threshing cylinder, ensuring smooth and continuous flow.

19. How Can Combine Losses Be Minimized?

Combine losses can be minimized by adjusting the machine settings, maintaining equipment properly, and optimizing harvest timing.

20. What are the Key Components of a Binder Combine Harvester?

Key components include the cutting platform, binding mechanism, and collection platform for bundling the cut crops.

21. What is the Difference Between a Baler and a Thresher?

A baler compresses and packages cut crops into bales, while a thresher separates grain from the crop residues after harvesting.

22. What is the Function of the Threshing Cylinder?

The threshing cylinder in a combine harvester provides the mechanical force necessary to separate the grain from the chaff during the threshing process.

23. What is the Impact of Crop Type on Combine Efficiency?

Different crop types require specific adjustments and settings on the combine harvester, affecting cutting, threshing, and overall efficiency.

24. Describe the Role of the Cleaning System in a Combine Harvester.

The cleaning system removes remaining chaff and debris from the harvested grain, ensuring high-quality grain collection.

25. How Do Field Conditions Affect Harvesting Operations?

Field conditions, such as moisture content, terrain, and crop density, can significantly impact the efficiency and effectiveness of harvesting operations.