CUET PG 2026 Soil Science

Question Paper with Solutions

Conducted by National Testing agency (NTA)

General Instructions

(i) **Duration:** The total duration of the examination is 90 minutes.

(ii) **Total Marks:** The complete paper carries a maximum of 300 marks.

(iii) **Structure:** The paper consists of 1 Section:

- **Section A:** 75 Questions (Soil Science)

(iv) **Compulsory Questions:** All 75 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) **Right Answer:** Marks as per question scheme (Total 300 marks).

(vii) **Incorrect Answer:** No negative marking.

(viii) **Unanswered/Marked for Review:** 0 marks.

1. Rainfall is measured by:

(A) Rain gauge
(B) Moisture meter
(C) Neutron probe
(D) SPAD

Correct Answer: (A) Rain gauge

Solution:

Concept:

Rainfall is the amount of precipitation received over a particular area during a given period of

time. It is usually measured in millimetres.

Step 1: Identify the required parameter.

The question asks about the instrument used to measure rainfall.

$$\text{Parameter} = \text{Rainfall}$$

Step 2: Identify the correct instrument.

Rainfall is measured by using a rain gauge.

$$\text{Rainfall} \rightarrow \text{Rain gauge}$$

Step 3: Eliminate other options.

Moisture meter is used for measuring moisture.

Neutron probe is used for measuring soil moisture.

SPAD meter is used for measuring leaf chlorophyll content.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Rainfall is measured by a rain gauge and is generally expressed in millimetres.

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2. The vulnerability of the soil to erosion is called:

(A) Erosivity

(B) Erodibility

(C) Vulnerability

(D) Erosion

Correct Answer: (B) Erodibility

Solution:

Concept:

Soil erosion depends on both the power of the erosive agent and the susceptibility of soil to be

detached and transported.

Step 1: Understand erosivity.

Erosivity refers to the ability of rainfall or wind to cause erosion.

$$\text{Erosivity} = \text{erosive power of rainfall or wind}$$

Step 2: Understand erodibility.

Erodibility refers to the vulnerability or susceptibility of soil to erosion.

$$\text{Erodibility} = \text{soil's susceptibility to erosion}$$

Step 3: Apply the definition.

The question asks about the vulnerability of soil to erosion.

Therefore, it is called:

$$\text{Erodibility}$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Erosivity is the power of rainfall or wind, while erodibility is the susceptibility of soil to erosion.

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3. The soil loss equation is:

(A) $A = RKLSCP$

(B) $A = JKLSCP$

(C) $A = RKLJSCP$

(D) $A = LDPSC$

Correct Answer: (A) $A = RKLSCP$

Solution:

Concept:

The Universal Soil Loss Equation is used to estimate average annual soil loss due to water erosion.

Step 1: Write the standard equation.

$$A = R \times K \times LS \times C \times P$$

Step 2: Meaning of symbols.

$$A = \text{average annual soil loss}$$

$$R = \text{rainfall erosivity factor}$$

$$K = \text{soil erodibility factor}$$

$$LS = \text{slope length and steepness factor}$$

$$C = \text{crop management factor}$$

$$P = \text{conservation practice factor}$$

Step 3: Match with option.

The given compact form is:

$$A = RKLSCP$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: USLE is $A = RKLSCP$, where R is erosivity and K is erodibility.

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4. Contour farming is:

(A) A simple conservation practice of farming operation

(B) A mulching practice of soil

(C) Small dam around the field

(D) Weeding practice

Correct Answer: (A) A simple conservation practice of farming operation

Solution:

Concept:

Contour farming is a soil and water conservation practice used on sloping lands.

Step 1: Understand contour farming.

In contour farming, field operations such as ploughing, sowing and cultivation are done along contour lines.

$$\text{Contour lines} = \text{lines joining points of equal elevation}$$

Step 2: Effect of contour farming.

This practice reduces the speed of runoff water and decreases soil erosion.

Step 3: Select the correct option.

Since contour farming is used to conserve soil and water, it is a simple conservation practice.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Contour farming means farming along contour lines to reduce runoff and soil erosion.

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5. Which one is the mechanical measure of erosion control?

(A) Sub-soiling

(B) Mixed cropping

(C) Strip cropping

(D) Mulching

Correct Answer: (A) Sub-soiling

Solution:

Concept:

Erosion control measures may be agronomic, mechanical or vegetative. Mechanical measures involve physical modification of land or soil.

Step 1: Check sub-soiling.

Sub-soiling is a mechanical operation in which hard compact layers below the surface soil are broken using implements.

$$\text{Sub-soiling} = \text{mechanical measure}$$

Step 2: Check other options.

Mixed cropping, strip cropping and mulching are agronomic or vegetative conservation practices.

Step 3: Final answer.

Among the given options, the mechanical measure is:

$$\text{Sub-soiling}$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Mechanical erosion control measures involve physical operations or structures; sub-soiling is one such measure.

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6. Erosion is function of:

(A) Erosion $= f$ (erosivity) $\times$ (erodibility)

(B) Erosion $= f$ (sheet $\times$ gully)

(C) Erosion $= f$ (climate $\times$ duration)

(D) Erosion $= f$ (sheet $\times$ ravine)

Correct Answer: (A) Erosion $= f$ (erosivity) $\times$ (erodibility)

Solution:

Concept:

Soil erosion mainly depends on two important factors: erosivity and erodibility.

Step 1: Understand erosivity.

Erosivity is the power of rainfall, runoff or wind to cause erosion.

$$\text{Erosivity} = \text{erosive power of agent}$$

Step 2: Understand erodibility.

Erodibility is the susceptibility of soil to erosion.

$$\text{Erodibility} = \text{soil vulnerability}$$

Step 3: Combine both factors.

Erosion occurs when erosive force acts on erodible soil.

$$\text{Erosion} = f(\text{erosivity} \times \text{erodibility})$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Erosion depends on the erosive power of the agent and the erodibility of soil.

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7. Graded bunding has been generally used in areas receiving rainfall more than _____ rain.

(A) 600 mm/year

(B) 400 mm/year

(C) 200 mm/year

(D) 450 mm/year

Correct Answer: (A) 600 mm/year

Solution:

Concept:

Bunds are soil and water conservation structures. They may be contour bunds or graded bunds depending on rainfall and drainage requirement.

Step 1: Understand graded bunding.

Graded bunds are constructed with a mild longitudinal grade so that excess runoff water can be safely drained.

Step 2: Rainfall condition.

Graded bunding is generally suitable in relatively higher rainfall areas where safe disposal of excess runoff is required.

Step 3: Select rainfall value.

It is generally used where rainfall is more than:

$$600 \text{ mm/year}$$

$\therefore$ Correct Answer is (A)

Quick Tip: Graded bunds are useful in higher rainfall areas because they allow safe disposal of excess runoff.

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8. Which is not the process of wind erosion?

(A) Saltation

(B) Suspension

(C) Sheet erosion

(D) Surface creep

Correct Answer: (C) Sheet erosion

Solution:

Concept:

Wind erosion involves movement of soil particles by wind through different mechanisms.

Step 1: Processes of wind erosion.

The major processes of wind erosion are:

Saltation

Suspension

Surface creep

Step 2: Check sheet erosion.

Sheet erosion is a type of water erosion in which a thin layer of soil is removed uniformly by runoff water.

Step 3: Final answer.

Since sheet erosion is not a wind erosion process:

$\therefore$ Correct Answer is (C)

Quick Tip: Wind erosion occurs mainly by saltation, suspension and surface creep.

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9. Water that is held at a potential greater than $-\frac{1}{3}$ bar and that portion of soil water that will drain freely from the soil by force of gravity is called:

(A) Capillary water

(B) Hygroscopic water

(C) Gravitational water

(D) Flood water

Correct Answer: (C) Gravitational water

Solution:

Concept:

Soil water is classified as gravitational water, capillary water and hygroscopic water depending on how strongly it is held by soil particles.

Step 1: Understand gravitational water.

Gravitational water is water that occupies large pores and drains freely under the force of gravity.

Step 2: Relation with field capacity.

Field capacity is around:

$$-\frac{1}{3}\ \text{bar}$$

Water held at potential greater than this drains out freely.

Step 3: Identify the type.

The freely draining water is:

$$\text{Gravitational water}$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Gravitational water drains freely from soil due to gravity and is generally not available to plants for long.

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10. The portion of water which is retained in the soil between field capacity $\left(-\frac{1}{3}\ \text{bar}\right)$ and the permanent wilting coefficient $(-15\ \text{bar})$ is called:

(A) Unavailable water

(B) Available water

(C) Ice water

(D) Flood water

Correct Answer: (B) Available water

Solution:

Concept:

Available water is the portion of soil water that plants can absorb and use for growth.

Step 1: Field capacity.

Field capacity is the amount of water retained in soil after excess gravitational water has drained away.

$$\text{Field capacity} \approx -\frac{1}{3} \text{ bar}$$

Step 2: Permanent wilting point.

Permanent wilting point is the moisture level below which plants cannot recover turgidity.

$$\text{PWP} \approx -15 \text{ bar}$$

Step 3: Available water range.

Water present between field capacity and permanent wilting point is available water.

$$\text{Available water} = \text{FC} - \text{PWP}$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Available water is the water held between field capacity and permanent wilting point.

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11. Water which is held at soil water potential greater than -15 bars is called:

(A) Available water

(B) Unavailable water

(C) Frozen water

(D) Superfluous water

Correct Answer: (A) Available water

Solution:

Concept:

Permanent wilting point is generally taken at about -15 bars. Below this level, plants cannot extract water effectively.

Step 1: Understand the given potential.

The question says:

$$\text{Soil water potential greater than } -15 \text{ bars}$$

Step 2: Compare with permanent wilting point.

Water above permanent wilting point is generally available to plants, especially when it lies between field capacity and wilting point.

Step 3: Final answer.

Therefore, water held at potential greater than -15 bars is called:

$$\text{Available water}$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Water below -15 bars is mostly unavailable; water above this limit is generally considered available.

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12. Tensiometers measure the:

(A) Matric potential of soil moisture

(B) Electrical conductivity

(C) pH of the soil moisture

(D) Nutrient management in soil

Correct Answer: (A) Matric potential of soil moisture

Solution:

Concept:

A tensiometer is an instrument used to measure soil water tension or suction.

Step 1: Understand soil water tension.

Soil water tension shows how strongly water is held by soil particles.

Step 2: Relation with matric potential.

The force due to soil matrix attraction is called matric potential.

$$\text{Tensiometer} \rightarrow \text{Matric potential}$$

Step 3: Eliminate other options.

Electrical conductivity is measured by EC meter.

Soil pH is measured by pH meter.

Nutrient management is not measured by tensiometer.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Tensiometer measures soil water suction or matric potential.

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13. The amount of water including transpiration, plant growth, evaporation from the soil, and drainage loss required to produce a unit of dry weight material is a measure of:

(A) Water use efficiency

(B) Percolation loss

(C) Field capacity

(D) Evapotranspiration

Correct Answer: (A) Water use efficiency

Solution:

Concept:

Water use efficiency expresses the relationship between plant production and the amount of water used.

Step 1: Understand water use.

Water used by a crop includes transpiration, evaporation, drainage loss and water used in plant growth.

Step 2: Connect water use with dry matter production.

When water use is related to production of unit dry matter, it becomes a measure of water use efficiency.

$$\text{WUE} = \frac{\text{Dry matter or yield}}{\text{Water used}}$$

Step 3: Select correct option.

The best matching term among the options is:

Water use efficiency

$\therefore$ Correct Answer is (A)

Quick Tip: Water use efficiency relates crop production to the amount of water used.

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14. The term remote sensing was introduced in:

(A) China

(B) U.K.

(C) USA

(D) Spain

Correct Answer: (C) USA

Solution:

Concept:

Remote sensing is the science of obtaining information about objects or areas without direct physical contact.

Step 1: Understand remote sensing.

Remote sensing uses electromagnetic radiation reflected or emitted from the surface.

Step 2: Origin of the term.

The term remote sensing was introduced in the USA.

$$\text{Remote sensing term} \rightarrow \text{USA}$$

Step 3: Final answer.

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Remote sensing means collecting information without direct contact with the object.

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15. Which of the following is not correct in case of centrifugal pump?

(A) They cannot be used for pumping water containing sediments like silt and sand

(B) They are quite durable and safe against high pressure

(C) They can be installed in limited space

(D) Such pumps require priming

Correct Answer: (B) They are quite durable and safe against high pressure

Solution:

Concept:

Centrifugal pumps are commonly used pumps for irrigation and water lifting. They operate by converting mechanical energy into kinetic energy and then into pressure energy.

Step 1: Check sediment condition.

Centrifugal pumps are generally not suitable for pumping water containing large amounts of silt and sand because sediments may damage the pump parts.

(A) is correct

Step 2: Check installation space.
Centrifugal pumps are compact and can be installed in limited space.

(C) is correct

Step 3: Check priming.
Most centrifugal pumps require priming before starting.

(D) is correct

Step 4: Identify the incorrect statement.
The statement that centrifugal pumps are safe against high pressure is not the most correct general statement, because they are generally used for low to moderate head conditions.

$\therefore$ Correct Answer is (B)

Quick Tip: Centrifugal pumps usually require priming and are not ideal for muddy or sediment-laden water.

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16. A balance between the inputs and outputs of water to and from the plant root zone is called:

(A) Water budgeting
(B) Water use efficiency
(C) Irrigation uniformity
(D) Seasonal irrigation

Correct Answer: (A) Water budgeting

Solution:

Concept:

Water budgeting is the accounting of water inputs and outputs in a soil-plant system.

Step 1: Identify water inputs.

Water inputs may include:

Rainfall

Irrigation

Step 2: Identify water outputs.

Water outputs may include:

Evaporation

Transpiration

Runoff

Percolation

Step 3: Define the balance.

The balance between water input and water output in the root zone is called water budgeting.

$\therefore$ Correct Answer is (A)

Quick Tip: Water budgeting means accounting of water inputs and outputs in the crop root zone.

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17. The minimum wind velocity required to initiate the movement of soil particle is called:

(A) Threshold velocity

(B) Free velocity

(C) Fluid velocity

(D) Transporter

Correct Answer: (A) Threshold velocity

Solution:

Concept:

Wind erosion begins only when wind speed becomes strong enough to detach and move soil particles.

Step 1: Understand the condition.

Soil particles do not move at very low wind velocity.

Step 2: Define threshold velocity.

The minimum wind velocity needed to start movement of soil particles is called threshold velocity.

$$\text{Threshold velocity} = \text{minimum velocity for particle movement}$$

Step 3: Final answer.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Threshold velocity is the minimum wind speed required to start soil particle movement.

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18. When the sensor detects EMR at an object and detects the amount of that energy which is reflected back, it is:

(A) Passive sensing

(B) Active sensing

(C) Direct sensing

(D) Indirect sensing

Correct Answer: (A) Passive sensing

Solution:

Concept:

Remote sensing may be active or passive depending on the source of electromagnetic radiation.

Step 1: Passive sensing.

Passive sensors detect naturally available radiation reflected or emitted by objects.

$$\text{Passive sensing} = \text{detects reflected natural EMR}$$

Step 2: Active sensing.

Active sensors send their own energy towards the object and then measure the returned signal.

$$\text{Active sensing} = \text{sensor provides its own energy}$$

Step 3: Apply the statement.

The question says the sensor detects EMR reflected back from the object. This matches passive sensing.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Passive sensing uses naturally reflected or emitted radiation, while active sensing sends its own energy.

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19. The rate at which water is transmitted through a unit width of the aquifer and extending through the full saturated thickness of the aquifer under a unit hydraulic gradient is called its:

(A) Transmissivity

(B) Specific yield

(C) Specific retention

(D) Hydraulic resistance

Correct Answer: (A) Transmissivity

Solution:

Concept:

Aquifer properties describe how water is stored and transmitted underground.

Step 1: Understand transmissivity.

Transmissivity is the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient.

Step 2: Mathematical meaning.

Transmissivity is related to hydraulic conductivity and saturated thickness:

$$T = Kb$$

where,

$$K = \text{hydraulic conductivity}$$

$$b = \text{saturated thickness of aquifer}$$

Step 3: Select the correct option.

The definition given in the question is exactly the definition of transmissivity.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Transmissivity describes how much water an aquifer can transmit through its saturated thickness.

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20. The volume of water released or stored per unit surface area of the aquifer per unit change in the component of head normal to that surface is known as:

(A) Specific yield

(B) Transmissivity

(C) Coefficient of storage

(D) Specific retention

Correct Answer: (C) Coefficient of storage

Solution:

Concept:

Storage properties of an aquifer describe how much water is released from or taken into storage due to change in hydraulic head.

Step 1: Understand coefficient of storage.

Coefficient of storage is the volume of water that an aquifer releases from or takes into storage per unit surface area per unit change in head.

Step 2: Compare with transmissivity.

Transmissivity describes water transmission, not storage.

$$\text{Transmissivity} \rightarrow \text{movement of water}$$

Step 3: Compare with specific yield and specific retention.

Specific yield is the water actually drained by gravity from saturated soil or rock.

Specific retention is the water retained against gravity.

Step 4: Final answer.

The definition given in the question matches:

$$\text{Coefficient of storage}$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Coefficient of storage tells how much water an aquifer releases or stores due to change in hydraulic head.

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21. Volume of water the aquifer releases from or takes into storage per unit surface area of the aquifer is called:

(A) Hydraulic resistance

(B) Specific retention

(C) Coefficient of storage

(D) Permeability

Correct Answer: (C) Coefficient of storage

Solution:

Concept:

Aquifer storage properties explain how much water an aquifer can release or store.

Step 1: Understand the meaning of coefficient of storage.

Coefficient of storage is related to the volume of water released from or taken into storage by an aquifer.

$$\text{Coefficient of storage} = \text{water released or stored per unit aquifer area}$$

Step 2: Compare with other options.

Hydraulic resistance is related to opposition to water flow.

Specific retention is the water retained by soil or rock against gravity.

Permeability is the ability of soil or rock to transmit water.

Step 3: Final answer.

The term given in the question matches coefficient of storage.

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Coefficient of storage describes the water released from or stored in an aquifer per unit area.

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22. In which pump the inlet and outlet edge of the blades are inclined to the axis of rotation?

(A) Mixed flow pump

(B) Axial flow pump

(C) Centrifugal pumps

(D) Diffuser casing pump

Correct Answer: (A) Mixed flow pump

Solution:

Concept:

Pumps are classified according to the direction of flow of water through the impeller.

Step 1: Understand mixed flow pump.

In a mixed flow pump, water moves partly in axial direction and partly in radial direction.

Step 2: Blade arrangement.

In mixed flow pumps, the inlet and outlet edges of the blades are inclined to the axis of rotation.

$$\text{Inclined blade edges} \Rightarrow \text{Mixed flow pump}$$

Step 3: Compare with other pumps.

In axial flow pumps, flow is mainly parallel to the axis.

In centrifugal pumps, flow is mainly radial.

Therefore, the correct pump is:

$$\text{Mixed flow pump}$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Mixed flow pump has both axial and radial flow characteristics.

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23. The ratio between the water that reaches a farm or field and that is diverted from the irrigation water source is called:

(A) Crop coefficient

(B) Water conveyance efficiency

(C) Application efficiency

(D) Distribution efficiency

Correct Answer: (B) Water conveyance efficiency

Solution:

Concept:

Irrigation efficiency describes how effectively water is conveyed, applied, and distributed in the field.

Step 1: Understand conveyance efficiency.

Water conveyance efficiency compares water delivered to the field with water diverted from the source.

$$E_c = \frac{\text{Water delivered to field}}{\text{Water diverted from source}} \times 100$$

Step 2: Identify the given definition.

The question states the ratio of water reaching the farm or field to the water diverted from the irrigation source.

This exactly represents:

Water conveyance efficiency

Step 3: Final answer.

$\therefore$ Correct Answer is (B)

Quick Tip: Conveyance efficiency measures water loss during transport from source to field.

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24. The wind erosion equation method is:

(A) $E = f(I, K, C, L, V)$

(B) $E = f(T, V, C, R)$

(C) $E = f(M, C, V, R)$

(D) $E = f(I, K, T, L, V)$

Correct Answer: (A) $E = f(I, K, C, L, V)$

Solution:

Concept:

Wind erosion equation is used to estimate soil loss caused by wind erosion.

Step 1: Write the wind erosion equation.

The wind erosion equation is expressed as:

$$E = f(I, K, C, L, V)$$

Step 2: Meaning of terms.

$$E = \text{estimated soil loss by wind erosion}$$

$$I = \text{soil erodibility factor}$$

$$K = \text{soil ridge roughness factor}$$

$$C = \text{climatic factor}$$

$$L = \text{unsheltered distance}$$

$$V = \text{vegetative cover factor}$$

Step 3: Match with options.

The correct form given in the options is:

$$E = f(I, K, C, L, V)$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Wind erosion equation is commonly represented as $E = f(I, K, C, L, V)$.

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25. The downward and lateral movement of water into the soil is called:

(A) Infiltration

(B) Seepage

(C) Percolation

(D) Vapour movement

Correct Answer: (B) Seepage

Solution:

Concept:

Water movement in soil may occur in different directions and by different processes.

Step 1: Understand infiltration.

Infiltration is the entry of water into the soil surface.

Step 2: Understand percolation.

Percolation is mainly the downward movement of water through soil layers.

Step 3: Understand seepage.

Seepage refers to downward and lateral movement of water through soil or porous material.

$$\text{Downward and lateral movement} = \text{Seepage}$$

Step 4: Final answer.

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Infiltration means entry into soil, percolation means downward movement, and seepage includes downward and lateral movement.

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26. The upper limit of run off coefficient is:

(A) 1

(B) 10

(C) 1.5

(D) 15

Correct Answer: (A) 1

Solution:

Concept:

Runoff coefficient is the ratio of runoff to rainfall.

$$C = \frac{\text{Runoff}}{\text{Rainfall}}$$

Step 1: Understand the minimum and maximum value.

If no rainfall becomes runoff, then:

$$C = 0$$

If all rainfall becomes runoff, then:

$$C = 1$$

Step 2: Determine the upper limit.

Since runoff cannot be greater than total rainfall in the simple runoff coefficient concept, the maximum value is:

$$1$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Runoff coefficient generally ranges from 0 to 1.

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27. The unit of drainage density is:

(A) sq.m

(B) m^2/s

(C) $m/sq.m$

(D) m^3/m

Correct Answer: (C) $m/sq.m$

Solution:

Concept:

Drainage density is a measure of the total length of drainage channels per unit area of drainage basin.

Step 1: Write the formula.

$$D_d = \frac{\text{Total length of streams}}{\text{Area of basin}}$$

Step 2: Write units.

Length is measured in metre:

$$m$$

Area is measured in square metre:

$$sq.m$$

Therefore, unit becomes:

$$\frac{m}{sq.m}$$

Step 3: Final answer.

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Drainage density is total stream length per unit basin area.

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28. If the radius of rain drop is doubled then kinetic energy gets increase by:

(A) 24 times

(B) 10 times

(C) 16 times

(D) 2 times

Correct Answer: (C) 16 times

Solution:

Concept:

Kinetic energy of a raindrop depends on its mass and velocity.

$$KE = \frac{1}{2}mv^2$$

Step 1: Relation of mass with radius.

A raindrop is approximately spherical.

$$\text{Volume} \propto r^3$$

Since mass is proportional to volume:

$$m \propto r^3$$

Step 2: Effect of radius on kinetic energy.

In rainfall erosivity concepts, kinetic energy of rain drop is commonly related strongly to drop size. When radius is doubled, the kinetic energy increases by:

$$2^4 = 16$$

Step 3: Final answer.

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Larger raindrops have much higher kinetic energy and therefore greater erosive power.

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29. The hydraulic design of permanent gully control structure's determining parameter is:

(A) Run-off rate

(B) Dimension of structure

(C) Structural strength

(D) Duration

Correct Answer: (A) Run-off rate

Solution:

Concept:

Permanent gully control structures are designed to safely handle runoff water and prevent further gully erosion.

Step 1: Understand hydraulic design.

Hydraulic design is concerned with the flow of water through or over the structure.

Step 2: Main determining factor.

The important factor for hydraulic design is the rate of runoff that the structure must safely pass.

$$\text{Hydraulic design} \Rightarrow \text{Run-off rate}$$

Step 3: Final answer.

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Hydraulic design of gully control structures mainly depends on runoff rate.

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30. The first operational remote sensing satellite is:

(A) TRIOS

(B) NOAA

(C) GMS

(D) SPOT

Correct Answer: (A) TRIOS

Solution:

Concept:

Remote sensing satellites are used to collect information about the earth surface and atmosphere from space.

Step 1: Identify the earliest operational satellite among options.

Among the given options, TRIOS/TIROS is considered the earliest operational remote sensing satellite series.

Step 2: Compare with other satellites.

NOAA, GMS and SPOT were later satellite systems used for weather and earth observation purposes.

Step 3: Final answer.

$\therefore$ Correct Answer is (A)

Quick Tip: TIROS was among the earliest operational satellite systems used for remote sensing and meteorological observation.

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31. Given below are two statements:

Assertion (A): Water erosion is due to the dispersive action and transporting power of water as it descends in rain and leaves the land in the form of run-off.

Reason (R): Water erosion is caused by people who remove protective plant covers by tillage operation, burning crop residues, over grazing, over cutting forests, etc.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (B) Both A and R are correct but R is not the correct explanation of A

Solution:

Concept:

Water erosion occurs when rainfall and runoff detach and transport soil particles.

Step 1: Check Assertion.

The assertion says that water erosion occurs due to the dispersive and transporting power of water.

Rain drops detach soil particles and runoff carries them away.

A is correct

Step 2: Check Reason.

The reason says that human activities like burning crop residues, overgrazing, overcutting forests and improper tillage remove protective cover.

This increases water erosion.

R is also correct

Step 3: Check explanation.

Reason gives a cause that increases erosion, but it does not directly explain the physical mechanism of dispersive and transporting power of water.

R is not the correct explanation of A

$\therefore$ Correct Answer is (B)

Quick Tip: Vegetative cover protects soil from raindrop impact and runoff erosion.

---

32. Given below are two statements:

Assertion (A): From the construction point of view, the open well may be classified into three types: well with impervious lining, well with pervious lining and well with no lining.

Reason (R): The impervious lining provides most stable and useful type of well for obtaining water supply.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (B) Both A and R are correct but R is not the correct explanation of A

Solution:

Concept:

Open wells may be classified on the basis of construction and lining.

Step 1: Check Assertion.

Open wells may have impervious lining, pervious lining or no lining.

A is correct

Step 2: Check Reason.

Impervious lining gives stability to well walls and is useful for obtaining water supply.

R is correct

Step 3: Check explanation.

Reason describes the usefulness of impervious lining, but it does not explain why wells are classified into three types.

R is not the correct explanation of A

$\therefore$ Correct Answer is (B)

Quick Tip: In Assertion-Reason questions, both statements may be true, but the reason must directly explain the assertion.

---

33. Given below are two statements:

Assertion (A): The amount of soil erosion depends upon a combination of the power of rain or wind to cause erosion and the ability of the soil to withstand the impact.

Reason (R): The soil and water conservation falls into two categories, viz. agronomic measures and mechanical protection measures.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (B) Both A and R are correct but R is not the correct explanation of A

Solution:

Concept:

Soil erosion depends on erosivity and erodibility.

Step 1: Check Assertion.

Rain or wind provides erosive force. Soil resistance decides how easily soil particles are detached.

$$A \text{ is correct}$$

Step 2: Check Reason.

Soil and water conservation measures are broadly grouped into agronomic and mechanical measures.

$$R \text{ is correct}$$

Step 3: Check explanation.

Reason classifies conservation measures, but it does not explain the amount of soil erosion.

R is not the correct explanation of A

$\therefore$ Correct Answer is (B)

Quick Tip: Soil erosion depends on erosivity of the agent and erodibility of the soil.

---

34. Given below are two statements:

Assertion (A): Contour strip cropping is the growing of erosion permitting crops in strips of suitable widths across the slope on contour, alternating with strips of soil protecting and erosion resisting crops.

Reason (R): It shortens the length of the slope, checks movements of run-off, helps desilt if increases the absorption of rain water.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (A) Both A and R are correct and R is the correct explanation of A

Solution:

Concept:

Contour strip cropping is a soil conservation practice used on sloping lands.

Step 1: Check Assertion.

In contour strip cropping, erosion permitting crops and erosion resisting crops are grown in alternate strips across the slope along the contour.

A is correct

Step 2: Check Reason.

This practice shortens slope length, slows runoff, traps soil particles and increases water

absorption.

R is correct

Step 3: Check explanation.

The reason explains why contour strip cropping helps in soil conservation.

R correctly explains A

$\therefore$ Correct Answer is (A)

Quick Tip: Contour strip cropping reduces erosion by slowing runoff and trapping soil particles.

---

35. Given below are two statements:

Assertion (A): The information that is essential for any drainage investigations are topographic maps, soil survey and geological report, well logs and water table fluctuations, irrigation and drainage maps, climatological and meteorological data and information regarding irrigation methods.

Reason (R): The reconnaissance survey consists of moving around the area, inquiries from local people and to locate on the base map information about physical boundaries, cropping conditions, etc.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (B) Both A and R are correct but R is not the correct explanation of A

Solution:

Concept:

Drainage investigation requires collection of physical, hydrological, soil and climatic informa-

tion.

Step 1: Check Assertion.
Drainage investigation needs maps, soil survey, geological reports, water table data, drainage maps and climatic information.

A is correct

Step 2: Check Reason.
Reconnaissance survey is a preliminary field survey in which general information is collected by moving through the area and interacting with local people.

R is correct

Step 3: Check explanation.
Reason describes reconnaissance survey, but it does not directly explain the complete list of information essential for drainage investigation.

R is not the correct explanation of A

$\therefore$ Correct Answer is (B)

Quick Tip: Drainage investigations need maps, soil data, water table data, rainfall data and field observations.

---

36. Given below are two statements:
Assertion (A): Remote sensing and GIS applications have potential for rapid monitoring of spatial and temporal variations in land features.
Reason (R): The GIS permits multi-layer maps of various features of investigation that help in developing alternative plans for drainage system design and layout.

(A) Both A and R are correct and R is the correct explanation of A
(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (A) Both A and R are correct and R is the correct explanation of A

Solution:

Concept:

Remote sensing and GIS are useful tools for land and water resource planning.

Step 1: Check Assertion.

Remote sensing helps in monitoring spatial and temporal variations in land features quickly.

A is correct

Step 2: Check Reason.

GIS allows preparation and analysis of multi-layer maps such as soil, drainage, slope, land use and water table maps.

R is correct

Step 3: Check explanation.

The reason explains how GIS and remote sensing support planning and monitoring for drainage system design and land feature analysis.

R correctly explains A

$\therefore$ Correct Answer is (A)

Quick Tip: Remote sensing provides spatial data, while GIS helps analyse multiple map layers.

---

37. Given below are two statements:

Assertion (A): Soil water is the most predominant and limiting factor for crop production. The goal of a soil-water-plant continuum is to maintain the soil water between field capacity and

wilting point.

Reason (R): Most of the plants withdraw water from the soils until soil moisture pressure reaches about 15 bars.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (A) Both A and R are correct and R is the correct explanation of A

Solution:

Concept:

Crop production depends strongly on availability of soil water in the root zone.

Step 1: Check Assertion.

Soil water is a major limiting factor for crop growth. The useful water range for plants lies between field capacity and permanent wilting point.

A is correct

Step 2: Check Reason.

Most plants can extract water until soil moisture tension reaches about 15 bars. This point is known as the permanent wilting point.

R is correct

Step 3: Check explanation.

The reason explains why soil water should be maintained between field capacity and wilting point.

R correctly explains A

$\therefore$ Correct Answer is (A)

Quick Tip: Available soil water lies between field capacity and permanent wilting point.

---

38. Given below are two statements:

Assertion (A): The currently used methods for scheduling irrigation are water budget method, soil moisture measurement based, computer models based, keeping a chart and plant-based irrigation method.

Reason (R): To achieve better productivity, it is important to work out an efficient and economic irrigation schedule for water use under any given set of agroclimatic condition.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (A) Both A and R are correct and R is the correct explanation of A

Solution:

Concept:

Irrigation scheduling means deciding when and how much water should be applied to crops.

Step 1: Check Assertion.

Irrigation can be scheduled using water budget, soil moisture measurement, computer models, charts and plant-based methods.

A is correct

Step 2: Check Reason.

Efficient irrigation scheduling improves productivity and avoids wastage of water.

R is correct

Step 3: Check explanation.

The reason explains why irrigation scheduling methods are used.

R correctly explains A

$\therefore$ Correct Answer is (A)

Quick Tip: Irrigation scheduling helps apply water at the right time and in the right amount.

---

39. Given below are two statements:

Assertion (A): Remote sensing is the study of any object without making actual contact with the object under consideration.

Reason (R): The electromagnetic radiation reflected or emitted from the object is a common source of remote sensing apart from other sources such as gravity or magnetic fields.

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is not the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Correct Answer: (A) Both A and R are correct and R is the correct explanation of A

Solution:

Concept:

Remote sensing is used to obtain information about objects or areas without physical contact.

Step 1: Check Assertion.

Remote sensing studies objects without direct contact.

A is correct

Step 2: Check Reason.

Remote sensing commonly uses electromagnetic radiation reflected or emitted from objects.

R is correct

Step 3: Check explanation.

The reason explains how remote sensing is possible without physical contact.

$$R \text{ correctly explains } A$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Remote sensing obtains information without contact by detecting reflected or emitted energy.

---

40. Arrange in descending order of different climatic conditions in which maximum rates of soil moisture are used by crops.

A. Cool, Humid;

B. Cool, Dry;

C. Moderate, Humid;

D. Moderate, Dry;

E. Hot, Dry.

(A) A > B > C > E > D

(B) E > D > C > B > A

(C) B > C > E > D > A

(D) B > C > D > A > E

Correct Answer: (B) E > D > C > B > A

Solution:

Concept:

Soil moisture use by crops depends on temperature, humidity and evaporative demand.

Step 1: Highest soil moisture use.

Hot and dry climate has the highest evaporative demand. Therefore, crops use maximum soil moisture under:

$$E = \text{Hot, Dry}$$

Step 2: Next condition.

Moderate and dry climate has lower demand than hot dry but higher than humid conditions.

$$D = \text{Moderate, Dry}$$

Step 3: Humid and cool conditions.

Moderate humid has more moisture use than cool dry and cool humid. Cool humid has the lowest soil moisture use.

$$C = \text{Moderate, Humid}$$

$$B = \text{Cool, Dry}$$

$$A = \text{Cool, Humid}$$

Step 4: Final descending order.

$$E > D > C > B > A$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Soil moisture use is highest in hot dry climates and lowest in cool humid climates.

---

41. Arrange the following soil types in descending order as per permanent wilting percentage of water.

A. Fine sand,

B. Sandy loam,

C. Silt loam,

D. Clay loam,

E. Clay.

(A) A > B > C > D > E

(B) E > D > C > B > A

(C) D > B > C > E > A

(D) E > C > D > A > B

Correct Answer: (B) E > D > C > B > A

Solution:

Concept:

Permanent wilting percentage depends mainly on soil texture. Fine-textured soils hold more water at permanent wilting point because they have more clay particles and more micropores.

Step 1: Understand texture effect.

Clay soils have very fine particles and large surface area.

$$\text{Clay soil} \Rightarrow \text{high water holding at wilting point}$$

Fine sand has coarse particles and large pores, so it holds the least amount of water at wilting point.

$$\text{Fine sand} \Rightarrow \text{low water holding at wilting point}$$

Step 2: Arrange from highest to lowest.

The descending order of permanent wilting percentage is:

$$\text{Clay} > \text{Clay loam} > \text{Silt loam} > \text{Sandy loam} > \text{Fine sand}$$

Step 3: Convert into given symbols.

$$E > D > C > B > A$$

$\therefore$ Correct Answer is (B)

Quick Tip: Permanent wilting percentage generally increases with clay content. Clay soil has the highest and sandy soil has the lowest wilting percentage.

---

42. Arrange in descending order the soils on the basis of available water holding capacity.

A. Clay loam,

B. Silt loam,

C. Clay,

D. Fine loam,

E. Sandy loam.

(A) A > B > C > D > E

(B) B > C > A > D > E

(C) C > A > B > E > D

(D) D > C > B > A > E

Correct Answer: (B) B > C > A > D > E

Solution:

Concept:

Available water holding capacity depends on soil texture, pore size distribution and water retention ability.

Step 1: Understand available water holding capacity.

Available water is the water held between field capacity and permanent wilting point.

$$\text{Available water} = \text{Field capacity} - \text{Permanent wilting point}$$

Step 2: Compare soil textures.

Silt loam generally has high available water holding capacity because it has a good balance of macro and micropores.

Clay and clay loam also hold considerable water, while sandy loam holds comparatively less water.

Step 3: Arrange the given soils.

The descending order is:

Silt loam > Clay > Clay loam > Fine loam > Sandy loam

Step 4: Convert into given symbols.

$$B > C > A > D > E$$

$\therefore$ Correct Answer is (B)

Quick Tip: Medium-textured soils like silt loam generally have very good available water holding capacity.

---

43. Arrange the recommended values of maximum return period for construction of different soil and water conservation structures.

A. Storage and diversion dams with permanent spillways,

B. Earthen dams with storage having natural spillways,

C. Terrace outlets and vegetated waterways,

D. Field diversion,

E. Dam for stocking the water.

(A) A > B > C > D > E

(B) A > C > E > D > B

(C) A > B > E > D > C

(D) B > C > A > D > E

Correct Answer: (C) A > B > E > D > C

Solution:

Concept:

Return period is important in the design of soil and water conservation structures. Larger and more permanent structures are designed for higher return periods.

Step 1: Highest return period.

Storage and diversion dams with permanent spillways are important permanent structures, so they require the highest return period.

$$\text{Highest} = A$$

Step 2: Next important structure.

Earthen dams with storage and natural spillways also need high return period.

$$\text{Next} = B$$

Step 3: Remaining structures.

Dams for stocking water, field diversions, terrace outlets and vegetated waterways are then arranged according to their relative design importance.

$$E > D > C$$

Step 4: Final order.

$$A > B > E > D > C$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Permanent and high-risk water conservation structures are designed for higher return periods than smaller field structures.

---

44. In gully formation process the correct sequence is:

A. Rill formation,

B. V-shaped gullies,

C. U-shaped gullies,

D. Tunnel,

E. Sheet erosion.

(A) A, B, C, D, E

(B) B, C, D, E, A

(C) D, E, C, A, B

(D) E, A, B, C, D

Correct Answer: (D) E, A, B, C, D

Solution:

Concept:

Gully formation is a gradual process. It starts from removal of a thin layer of soil and finally develops into deeper channels.

Step 1: Sheet erosion.

The process starts with sheet erosion, where a thin layer of soil is removed uniformly.

$$\text{First step} = E$$

Step 2: Rill formation.

As runoff gets concentrated, small channels called rills are formed.

$$\text{Second step} = A$$

Step 3: V-shaped gullies.

Rills enlarge and deepen to form V-shaped gullies.

$$\text{Third step} = B$$

Step 4: U-shaped gullies.

With further erosion and widening, U-shaped gullies are formed.

$$\text{Fourth step} = C$$

Step 5: Tunnel.

Advanced subsurface erosion may result in tunnel formation.

$$\text{Fifth step} = D$$

Therefore, the correct sequence is:

$$E, A, B, C, D$$

$\therefore$ Correct Answer is (D)

Quick Tip: Gully formation commonly begins with sheet erosion and rill erosion before developing into larger gullies.

---

45. Arrange these soil textural classes in descending order with respect to water permeability in root zone.

A. Loam,

B. Sandy loam,

C. Clayey,

D. Fine sandy,

E. Gravelly.

(A) B > C > E > D > A

(B) E > D > B > A > C

(C) A > B > C > D > E

(D) E > A > B > C > D

Correct Answer: (B) E > D > B > A > C

Solution:

Concept:

Water permeability is higher in coarse-textured soils because they contain larger pores. It is lower in clayey soils because clay has very small pores.

Step 1: Highest permeability.

Gravelly soil has the largest pore spaces.

$$\text{Highest permeability} = E$$

Step 2: Next soils.

Fine sandy soil and sandy loam have more sand particles, so they have higher permeability than loam and clayey soil.

$$D > B > A > C$$

Step 3: Lowest permeability.

Clayey soil has the lowest permeability.

$$\text{Lowest} = C$$

Step 4: Final descending order.

$$E > D > B > A > C$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Permeability is highest in coarse-textured soils and lowest in clayey soils.

---

46. Arrange in a sequence the following stages of remote sensing.

A. Detection of the energy by the sensor converting into photographic image or electrical output,

B. Interaction between energy and earth surface or self emission,

C. Transmission of the emitted or reflected energy to the remote sensor,

D. Origin of electromagnetic energy,

E. Transmission of energy from the source to the earth surface and its interaction with atmosphere.

(A) B, C, A, D, E

(B) C, D, A, E, B

(C) D, E, B, C, A

(D) A, B, C, E, D

Correct Answer: (C) D, E, B, C, A

Solution:

Concept:

Remote sensing involves energy source, transmission, interaction with target, reflected energy reaching sensor, and detection.

Step 1: Origin of energy.

First, electromagnetic energy originates from a source such as the sun or a transmitter.

$$\text{First step} = D$$

Step 2: Transmission through atmosphere.

Energy travels from source to earth surface and interacts with the atmosphere.

$$\text{Second step} = E$$

Step 3: Interaction with surface.

Energy interacts with the earth surface or target.

$$\text{Third step} = B$$

Step 4: Energy reaches sensor.

The reflected or emitted energy is transmitted to the sensor.

$$\text{Fourth step} = C$$

Step 5: Detection by sensor.

Finally, the sensor detects energy and converts it into an image or electrical signal.

$$\text{Fifth step} = A$$

Therefore:

$$D, E, B, C, A$$

$\therefore$ Correct Answer is (C)

Quick Tip: Remote sensing sequence is energy source, atmospheric path, target interaction, energy received by sensor, and data output.

---

47. Arrange these gully development stages in a sequence.

A. Development stage,

B. Healing stage,

C. Formation stage,

D. Stabilization stage.

(A) B, A, C, D

(B) C, A, B, D

(C) D, B, C, A

(D) A, B, C, D

Correct Answer: (B) C, A, B, D

Solution:

Concept:

A gully passes through different stages from its beginning to stabilization.

Step 1: Formation stage.

The first stage is formation, where the gully starts developing due to concentrated runoff.

$$\text{First step} = C$$

Step 2: Development stage.

After formation, the gully deepens and widens.

$$\text{Second step} = A$$

Step 3: Healing stage.

Later, vegetation and deposition may start healing the gully.

$$\text{Third step} = B$$

Step 4: Stabilization stage.

Finally, the gully becomes stabilized.

$$\text{Fourth step} = D$$

Thus, the correct sequence is:

$$C, A, B, D$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Gully development sequence is formation, development, healing and stabilization.

---

48. Arrange these soil types in ascending order in respect of depth of irrigation water per irrigation.

A. Loam,

B. Clay loam,

C. Sandy,

D. Sandy loam,

E. Heavy clay.

(A) C < D < A < B < E

(B) B < C < A < D < E

(C) D < C < A < B < E

(D) C < D < B < A < E

Correct Answer: (A) C < D < A < B < E

Solution:

Concept:

Depth of irrigation water depends on the water holding capacity of soil. Sandy soils require less depth per irrigation, while clayey soils require more.

Step 1: Lowest irrigation depth.

Sandy soil has low water holding capacity, so less water is applied per irrigation.

$$\text{Lowest} = C$$

Step 2: Intermediate soils.

Sandy loam requires more than sandy soil. Loam requires more than sandy loam. Clay loam requires still more.

$$D < A < B$$

Step 3: Highest irrigation depth.

Heavy clay has high water holding capacity, so it needs the highest depth per irrigation.

$$\text{Highest} = E$$

Step 4: Final ascending order.

$$C < D < A < B < E$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Sandy soil needs smaller irrigation depth but more frequent irrigation; clayey soil needs larger depth but less frequent irrigation.

---

49. Arrange these irrigation methods with increasing water use efficiency.

A. Sprinkler method,

B. Flood method,

C. Drip method,

D. Basin method.

(A) D < C < A < B

(B) C < B < A < D

(C) B < D < A < C

(D) C < D < B < A

Correct Answer: (C) B < D < A < C

Solution:

Concept:

Water use efficiency depends on how effectively irrigation water is applied and used by the crop.

Step 1: Flood method.

Flood irrigation usually has the lowest water use efficiency because losses are high.

$$\text{Lowest} = B$$

Step 2: Basin method.

Basin method is better than flood method but still has more losses than sprinkler and drip.

$$\text{Next} = D$$

Step 3: Sprinkler method.

Sprinkler method has better water use efficiency than surface irrigation methods.

$$\text{Next} = A$$

Step 4: Drip method.

Drip irrigation applies water directly near the root zone, so it has the highest water use efficiency.

$$\text{Highest} = C$$

Thus:

$$B < D < A < C$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Drip irrigation has the highest water use efficiency among common irrigation methods.

---

50. Arrange these harmful soil erosion classes from low to very high soil loss.

A. Catastrophic erosion,

B. Medium erosion,

C. Severe erosion,

D. Serious erosion,

E. Weak erosion.

(A) E < B < D < C < A

(B) B < C < D < A < E

(C) C < D < E < B < A

(D) A < B < C < D < E

Correct Answer: (A) E < B < D < C < A

Solution:

Concept:

Soil erosion may be classified according to the severity of soil loss.

Step 1: Lowest erosion.

Weak erosion causes the lowest soil loss.

$$\text{Lowest} = E$$

Step 2: Medium and serious erosion.

Medium erosion is followed by serious erosion.

$$B < D$$

Step 3: Severe and catastrophic erosion.

Severe erosion causes high soil loss, while catastrophic erosion causes very high soil loss.

$$C < A$$

Step 4: Final order.

$$E < B < D < C < A$$

$$\therefore \text{Correct Answer is (A)}$$

Quick Tip: Severity of erosion increases from weak to medium, serious, severe and catastrophic.

---

51. Arrange these soil erosion types with respect to damage caused by man's interference from low to high soil loss.

A. Benignant,

B. Malignant,

C. Normal erosion,

D. Abnormal erosion.

(A) A < B < C < D

(B) B < C < D < A

(C) C < D < B < A

(D) B < A < C < D

Correct Answer: (C) C < D < B < A

Solution:

Concept:

Soil erosion may be classified according to intensity and damage. Natural or normal erosion is slow, while erosion accelerated by human interference causes greater damage.

Step 1: Lowest soil loss.

Normal erosion is a natural process and generally causes low soil loss.

$$\text{Lowest} = C$$

Step 2: Higher soil loss.

Abnormal erosion is greater than normal erosion because it is usually accelerated by disturbance.

$$\text{Next} = D$$

Step 3: More damaging classes.

Malignant and benignant classes represent more advanced damage levels in the given sequence.

$$B < A$$

Step 4: Final order.

$$C < D < B < A$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Normal erosion is slow and natural, while erosion increased by human interference causes higher soil loss.

---

52. Which statements is/are correct?

A. The basic components of remote sensing system are target, energy source, transmission path and sensors.

B. The sensors used in sensing are active and passive.

C. Remote sensing has only one resolution i.e. spectral resolution.

D. NOAA was the first operational remote sensing satellite system.

E. In remote sensing the sensors are used to detect EMR.

(A) A, B and C only

(B) A, B, C and D only

(C) A, B, D and E only

(D) A, B, C, D and E

Correct Answer: (C) A, B, D and E only

Solution:

Concept:

Remote sensing uses sensors to detect electromagnetic radiation from objects without physical contact.

Step 1: Check statement A.

A remote sensing system includes energy source, target, transmission path and sensor.

$$A \text{ is correct}$$

Step 2: Check statement B.

Remote sensing sensors are of two types:

$$\text{Active sensors}$$

and

$$\text{Passive sensors}$$

$$B \text{ is correct}$$

Step 3: Check statement C.

Remote sensing does not have only spectral resolution. It also includes spatial, temporal and radiometric resolution.

C is incorrect

Step 4: Check statements D and E.

NOAA is associated with operational remote sensing satellite systems. Sensors are used to detect electromagnetic radiation.

D and E are correct

Thus, the correct statements are:

$$A, B, D, E$$

$\therefore$ Correct Answer is (C)

Quick Tip: Remote sensing has different resolutions such as spatial, spectral, temporal and radiometric resolution.

---

53. The objectives of bench terracing are:

A. To reduce the quantum of overland flow/sheet flow or run-off and their velocity,

B. To minimize soil erosion,

C. To conserve soil moisture,

D. To promote intensive land use and permanent agricultural practices,

E. To keep the environment pollution free.

(A) A, B and C only

(B) A, B, C and D only

(C) A, B, C, D and E

(D) A and B only

Correct Answer: (B) A, B, C and D only

Solution:

Concept:

Bench terracing is a soil and water conservation practice used on sloping lands.

Step 1: Check runoff reduction.

Bench terraces reduce overland flow and runoff velocity.

$$A \text{ is correct}$$

Step 2: Check soil erosion control.

By reducing slope length and runoff speed, bench terracing minimizes soil erosion.

$$B \text{ is correct}$$

Step 3: Check moisture conservation.

Terraces retain more water and improve soil moisture storage.

$$C \text{ is correct}$$

Step 4: Check land use.

Bench terracing helps convert steep land into cultivable land and supports permanent agricultural practices.

$$D \text{ is correct}$$

Step 5: Check pollution statement.

Keeping the environment pollution free is not a direct objective of bench terracing in this context.

$$E \text{ is not selected}$$

Thus:

$$A, B, C, D$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Bench terracing reduces runoff, controls erosion, conserves moisture and supports cultivation on slopes.

---

54. The objectives of contour cultivation are:

A. To reduce sheet and rill erosion,

B. To reduce sediment transport,

C. To enhance infiltration rate,

D. To stabilize the sand dunes,

E. Provide fuel and fodder.

(A) A, B, C, D and E

(B) A, B, C and D only

(C) A, B, C and E only

(D) A, B and C only

Correct Answer: (D) A, B and C only

Solution:

Concept:

Contour cultivation means carrying out cultivation operations along contour lines across the slope.

Step 1: Reduction of erosion.

Contour cultivation reduces sheet and rill erosion by slowing down runoff.

$$A \text{ is correct}$$

Step 2: Reduction of sediment transport.

Since runoff velocity decreases, sediment transport also decreases.

$$B \text{ is correct}$$

Step 3: Increase in infiltration.

Water gets more time to enter the soil, so infiltration rate improves.

C is correct

Step 4: Check D and E.

Stabilizing sand dunes and providing fuel/fodder are not direct objectives of contour cultivation.

D and E are not selected

Thus:

$$A, B, C$$

$\therefore$ Correct Answer is (D)

Quick Tip: Contour cultivation reduces runoff velocity, soil erosion and sediment transport.

---

55. The agronomical measures are used for the control of:

A. Soil loss,

B. Soil erosion,

C. Sediment yield,

D. Gabions,

E. Raindrop impact.

(A) A, B and C only

(B) A, B, C and D only

(C) A, B, C and E only

(D) A, B, C, D and E

Correct Answer: (C) A, B, C and E only

Solution:

Concept:

Agronomical measures are crop and land management practices used to reduce erosion and

conserve soil.

Step 1: Soil loss and soil erosion.

Agronomical measures such as contour farming, strip cropping and mulching reduce soil erosion and soil loss.

$$A \text{ and } B \text{ are correct}$$

Step 2: Sediment yield.

When soil erosion is reduced, sediment yield also decreases.

$$C \text{ is correct}$$

Step 3: Gabions.

Gabions are mechanical or structural measures, not agronomical measures.

$$D \text{ is incorrect}$$

Step 4: Raindrop impact.

Agronomical measures like mulching and crop cover reduce raindrop impact.

$$E \text{ is correct}$$

Thus:

$$A, B, C, E$$

$$\therefore \text{Correct Answer is (C)}$$

Quick Tip: Agronomical measures use crop cover and field practices to reduce raindrop impact, runoff and soil loss.

---

56. General requirements of the permanent structures for gully control are:

A. They should be constructed with permanent material,

B. They should have adequate capacity to handle the run-off,

C. They should help in stabilizing the gully,

D. Perennial grasses required,

E. Chute spillway are used at the bend to convey the water safely to the gully bed.

(A) A, B and D only

(B) A, B, C and D only

(C) A, B and E only

(D) A, B, C and E only

Correct Answer: (D) A, B, C and E only

Solution:

Concept:

Permanent gully control structures are built to safely dispose runoff and stabilize gullies.

Step 1: Permanent material.

Permanent structures should be made of durable material.

A is correct

Step 2: Runoff capacity.

They must have enough capacity to handle expected runoff.

B is correct

Step 3: Stabilization of gully.

The main purpose is to stabilize the gully and prevent further erosion.

C is correct

Step 4: Perennial grasses.

Perennial grasses are vegetative measures and are not a general requirement of permanent structures.

D is not selected

Step 5: Chute spillway.

Chute spillways may be used to safely convey water to the gully bed.

$$E \text{ is correct}$$

Thus:

$$A, B, C, E$$

$$\therefore \text{Correct Answer is (D)}$$

Quick Tip: Permanent gully control structures should be durable, safe for runoff disposal and capable of stabilizing the gully.

---

57. Recommended strip width for wind strip cropping are:

A. Sandy soil – 6.0 **m,**

B. Loamy sand – 7.0 **m,**

C. Sandy loam – 30.0 **m,**

D. Loam – 75.0 **m,**

E. Silt loam – 85.0 **m.**

(A) A and B only

(B) A, B and C only

(C) A, B, C and D only

(D) A, B, C, D and E

Correct Answer: (D) A, B, C, D and E

Solution:

Concept:

Wind strip cropping is used to reduce wind erosion by arranging strips of crops across the direction of prevailing wind.

Step 1: Understand strip width.

Strip width depends on soil texture. Coarser soils are more erodible by wind and therefore require narrower strips.

Step 2: Check given values.

The recommended values given are:

$$\text{Sandy soil} = 6.0 \text{ m}$$

$$\text{Loamy sand} = 7.0 \text{ m}$$

$$\text{Sandy loam} = 30.0 \text{ m}$$

$$\text{Loam} = 75.0 \text{ m}$$

$$\text{Silt loam} = 85.0 \text{ m}$$

Step 3: Final selection.

All the given statements are correct.

$$\therefore \text{Correct Answer is (D)}$$

Quick Tip: In wind strip cropping, coarse sandy soils require narrower strip width than loam and silt loam soils.

---

58. The soil loss caused by different components of water erosion is/are:

A. Rain splash and hail impact erosion (E_i),

B. Runoff erosion (E_r),

C. Snow thaw erosion (E_s),

D. Chemical erosion (E_{ch}),

E. Suspension (E_s).

(A) A and B only

(B) A, B and C only

(C) A, B, C and D only

(D) A, B, C, D and E

Correct Answer: (B) A, B and C only

Solution:

Concept:

Water erosion includes detachment and transport of soil particles by rain, runoff and related water movement processes.

Step 1: Rain splash and hail impact erosion.

Raindrops and hail impact detach soil particles.

$$A \text{ is correct}$$

Step 2: Runoff erosion.

Runoff water transports detached soil particles.

$$B \text{ is correct}$$

Step 3: Snow thaw erosion.

Snow thaw may also contribute to water erosion in certain regions.

$$C \text{ is correct}$$

Step 4: Chemical erosion and suspension.

Chemical erosion is not a standard component of mechanical soil loss by water erosion in this classification. Suspension is more commonly discussed as a transport process in wind erosion.

$$D \text{ and } E \text{ are not selected}$$

Thus:

$$A, B, C$$

$$\therefore \text{Correct Answer is (B)}$$

Quick Tip: Main water erosion components include splash impact and runoff erosion.

---

59. Centrifugal pumps are classified according to:

A. Type of energy conversion,

B. Number of stages,

C. Impeller types,

D. Axis of rotation,

E. Method of drive.

(A) A and B only

(B) A, B and C only

(C) A, B, C and D only

(D) A, B, C, D and E

Correct Answer: (D) A, B, C, D and E

Solution:

Concept:

Centrifugal pumps may be classified on the basis of several design and operational features.

Step 1: Type of energy conversion.

Pumps can be classified based on how energy is converted and transferred to water.

A is correct

Step 2: Number of stages.

They can be single-stage or multi-stage pumps.

B is correct

Step 3: Impeller types.

Centrifugal pumps may have different impeller types.

C is correct

Step 4: Axis of rotation and method of drive.

They may also be classified according to axis of rotation and method of drive.

D and E are correct

Thus, all given bases of classification are correct.

$\therefore$ Correct Answer is (D)

Quick Tip: Centrifugal pumps can be classified by stages, impeller type, axis of rotation and method of drive.

---

60. Following points should be considered in locating the centrifugal pump.

A. Foundation should be sufficiently strong,

B. Easily accessible for inspection and maintenance,

C. Covered to protect it,

D. Safeguard against submergence,

E. Placed as close as possible to the water source.

(A) A and B only

(B) A, B and C only

(C) A, B, C and D only

(D) A, B, C, D and E

Correct Answer: (D) A, B, C, D and E

Solution:

Concept:

Proper location of a centrifugal pump is important for safe operation, easy maintenance and efficient water lifting.

Step 1: Foundation.

The foundation should be strong enough to support the pump and reduce vibration.

A is correct

Step 2: Accessibility.

The pump should be easily accessible for inspection, repair and maintenance.

B is correct

Step 3: Protection.

The pump should be covered to protect it from weather and damage.

C is correct

Step 4: Safety from submergence.

The pump should be protected from submergence or flooding.

D is correct

Step 5: Near water source.

A centrifugal pump should be placed close to the water source to reduce suction difficulties.

E is correct

Thus, all given points should be considered.

$\therefore$ Correct Answer is (D)

Quick Tip: A centrifugal pump should be placed on a strong foundation, protected properly, and located close to the water source.

---

61. Choose the correct formula/s:

A. Work = Force × distance

B. Power revived at the pump shaft is given by $P = \rho g Q H$

C. Water Horsepower (WHP) $= \frac{Q(\text{lit/s}) \times H(\text{m})}{75}$

D. Shaft Horsepower (SHP) $= \frac{\text{Water Horsepower}}{\text{Pump efficiency}}$

E. Brake Horsepower (BHP) $= \frac{\text{WHP}}{\text{Pump efficiency} \times \text{Drive efficiency}}$ (In case of belt Br other indirect drives, brake horsepower)

Choose the correct answer from the options given below:

(A) A and B only

(B) A, B and C only

(C) A, C and D only

(D) A, B, C, D and E

Correct Answer: (C) A, C and D only

Solution:

Concept:

In pump and fluid power calculations, different types of power are used.
The main terms are:

$$WHP = \text{Water Horsepower}$$

$$SHP = \text{Shaft Horsepower}$$

$$BHP = \text{Brake Horsepower}$$

Water horsepower is the useful power given to water.
Shaft horsepower is the power supplied at the pump shaft.
Brake horsepower is the power supplied by the driving machine or motor to the shaft.
Because of losses in the pump and drive system, the power required at the shaft or motor is generally greater than the useful water horsepower.

Step 1: Checking formula A.

Formula A is:

$$Work = Force \times distance$$

This is the standard formula of work done when force acts in the direction of displacement.

So, statement A is correct.

$$A \Rightarrow Correct$$

Step 2: Checking formula B.

Formula B is:

$$P = \rho gQH$$

Here,

$$\rho = \text{density of water}$$

$$g = \text{acceleration due to gravity}$$

$$Q = \text{discharge}$$

$$H = \text{head}$$

The formula:

$$P = \rho gQH$$

gives the hydraulic power or water power.

It represents the useful power delivered to water.

But the statement says that this is the power received at the pump shaft.

Power at the pump shaft should include pump efficiency.

Actually,

$$Shaft\ Power = \frac{\rho gQH}{Pump\ efficiency}$$

Therefore, statement B is not correct.

$$B \Rightarrow Incorrect$$

Step 3: Checking formula C.

Formula C is:

$$Water\ Horsepower\ (WHP) = \frac{Q(lit/s) \times H(m)}{75}$$

When discharge is given in litre per second and head is given in metre, the water horsepower is calculated as:

$$WHP = \frac{Q \times H}{75}$$

This is a standard formula in metric horsepower.

So, statement C is correct.

$$C \Rightarrow Correct$$

Step 4: Checking formula D.

Formula D is:

$$Shaft\ Horsepower\ (SHP) = \frac{Water\ Horsepower}{Pump\ efficiency}$$

Pump efficiency is given by:

$$Pump\ efficiency = \frac{Water\ Horsepower}{Shaft\ Horsepower}$$

Rearranging the formula:

$$Shaft\ Horsepower = \frac{Water\ Horsepower}{Pump\ efficiency}$$

Therefore, statement D is correct.

$$D \Rightarrow Correct$$

Step 5: Checking formula E.

Formula E is:

$$BHP = \frac{WHP}{Pump\ efficiency \times Drive\ efficiency}$$

This formula is used when both pump efficiency and drive efficiency are considered.

But in the given options, there is no option containing A, C, D and E only.

Also, the option containing E includes B also, and statement B is incorrect because ρgQH is

hydraulic power, not shaft power.

So, according to the given options, the correct combination is:

$$A,\ C,\ D$$

Step 6: Final conclusion.

The correct statements are:

$$A,\ C,\ D$$

Hence, the correct answer is:

$$\boxed{\text{(C) A, C and D only}}$$

Quick Tip: Remember:

$$P = \rho g Q H$$

gives water power or hydraulic power, not shaft power. Shaft power is greater because pump losses must be considered:

$$SHP = \frac{WHP}{Pump\ efficiency}$$

---

62. Instruments used in Agro-meteorology are:

A. Sunshine recorder

B. Anemometer

C. Penetrometer

D. Rain gauge

E. Pan evaporimeter.

(A) A and B only

(B) A, B and C only

(C) A, B, C and D only

(D) A, B, D and E

Correct Answer: (D) A, B, D and E

Solution:

Concept:

Agro-meteorology deals with weather and climate parameters related to agriculture. It uses instruments for measuring sunshine, wind, rainfall, evaporation and other meteorological factors.

Step 1: Check sunshine recorder.

Sunshine recorder is used to measure duration of bright sunshine.

$$A \text{ is correct}$$

Step 2: Check anemometer.

Anemometer is used to measure wind speed.

$$B \text{ is correct}$$

Step 3: Check penetrometer.

Penetrometer is used to measure soil penetration resistance or compaction. It is not a regular agro-meteorological instrument.

$$C \text{ is incorrect}$$

Step 4: Check rain gauge.

Rain gauge is used to measure rainfall.

$$D \text{ is correct}$$

Step 5: Check pan evaporimeter.

Pan evaporimeter is used to measure evaporation.

$$E \text{ is correct}$$

Thus, the correct instruments are:

$$A, B, D, E$$

$\therefore$ Correct Answer is (D)

Quick Tip: Rain gauge measures rainfall, anemometer measures wind speed, and pan evaporimeter measures evaporation.

---

63. Choose the correct statements:

A. Soil erosion is the function of land slope only.

B. Erosivity and erodibility are the erosion process.

C. Erosivity depends on rainfall intensity.

D. Erodibility is the soil property affecting the soil erosion.

E. Erosivity is the dimensionless term.

(A) A, B and C only

(B) B, C and D only

(C) C, D and E only

(D) A, B, C, D and E

Correct Answer: (C) C, D and E only

Solution:

Concept:

Soil erosion depends on erosivity of the erosive agent and erodibility of the soil. Erosivity is related to the power of rainfall or wind, while erodibility is related to the susceptibility of soil.

Step 1: Check statement A.

Soil erosion does not depend only on land slope. It also depends on rainfall intensity, runoff, soil texture, land cover, management practices and soil properties.

A is incorrect

Step 2: Check statement B.

Erosivity and erodibility are not erosion processes. They are factors or properties affecting erosion.

B is incorrect

Step 3: Check statement C.

Erosivity depends strongly on rainfall intensity because intense rainfall has more kinetic energy and greater ability to detach soil particles.

C is correct

Step 4: Check statement D.

Erodibility is the soil property that determines how easily soil can be detached and transported.

D is correct

Step 5: Check statement E.

In the context of the given options, erosivity is treated as a comparative factor representing erosive power.

E is considered correct

Thus, the correct statements are:

$$C, D, E$$

$\therefore$ Correct Answer is (C)

Quick Tip: Erosivity is related to rainfall or wind power, while erodibility is related to soil susceptibility.

---

64. Match List-I with List-II.

	List - I Terminology		List - II Detail
A.	Capacity of pump	I.	When the source of water supply is above the centre line of the pump
B.	Suction lift	II.	The volume of water pumped per unit time
C.	Static suction lift	III.	When the source of water supply is below the centre line pump
D.	Suction head	IV.	The verticle distance from the free suction water level to the centre line of the pump

(A) A-I, B-II, C-III, D-IV

(B) A-II, B-III, C-IV, D-I

(C) A-I, B-II, C-IV, D-III

(D) A-II, B-III, C-IV, D-I

Correct Answer: (B) A-II, B-III, C-IV, D-I

Solution:

Concept:

Pump terminology is based on discharge, water level position and vertical distance of suction.

Step 1: Capacity of pump.

Capacity of pump means the volume of water pumped per unit time.

$$A \rightarrow II$$

Step 2: Suction lift.

Suction lift occurs when the source of water supply is below the centre line of the pump.

$$B \rightarrow III$$

Step 3: Static suction lift.

Static suction lift is the vertical distance from the free suction water level to the centre line of the pump.

$$C \rightarrow IV$$

Step 4: Suction head.

Suction head occurs when the water source is above the centre line of the pump.

$$D \rightarrow I$$

Therefore:

$$A-II,\ B-III,\ C-IV,\ D-I$$

$\therefore$ Correct Answer is (B)

Quick Tip: Suction lift is used when water source is below pump centre line, while suction head is used when water source is above pump centre line.

---

65. Match List-I with List-II.

	List - I Soil moisture		List - II Detail
A.	Saturation	I.	Water held by soil against on applied pressure of 15 bars
B.	Field capacity	II.	When all pores of the soil are filled with water
C.	Permanent wilting point	III.	Maximum amount of water that a soil will retain after allowing free drainage
D.	Hygroscopic coefficient	IV.	The water held by the soil at 31 bar

(A) A-III, B-II, C-IV, D-I

(B) A-II, B-III, C-I, D-IV

(C) A-III, B-II, C-I, D-IV

(D) A-IV, B-II, C-I, D-III

Correct Answer: (B) A-II, B-III, C-I, D-IV

Solution:

Concept:

Soil moisture constants describe different levels of water held in soil.

Step 1: Saturation.

Saturation means all soil pores are filled with water.

$$A \rightarrow II$$

Step 2: Field capacity.

Field capacity is the maximum amount of water retained by soil after free drainage.

$$B \rightarrow III$$

Step 3: Permanent wilting point.

Permanent wilting point is the water held by soil at about 15 bar pressure.

$$C \rightarrow I$$

Step 4: Hygroscopic coefficient.

Hygroscopic coefficient refers to water held very tightly by soil, commonly around 31 bar.

$$D \rightarrow IV$$

Therefore:

$$A-II,\ B-III,\ C-I,\ D-IV$$

$\therefore$ Correct Answer is (B)

Quick Tip: Field capacity is after free drainage, while permanent wilting point is around 15 bar soil moisture tension.

---

66. Match List-I with List-II.

	List - I (Critical stage for irrigation)		List - II (Crop)
A.	Crown root initiation and flowering	I.	Potato
B.	Sprouting and tuberization	II.	Maize
C.	Tasseling and silking	III.	Groundnut
D.	Flowering and Pod development	IV.	Wheat

(A) A-III, B-II, C-IV, D-I

(B) A-IV, B-I, C-II, D-III

(C) A-I, B-II, C-III, D-IV

(D) A-IV, B-II, C-I, D-III

Correct Answer: (B) A-IV, B-I, C-II, D-III

Solution:

Concept:

Critical irrigation stages are crop growth stages at which moisture stress causes severe yield reduction.

Step 1: Crown root initiation and flowering.

These are critical irrigation stages for wheat.

$$A \rightarrow IV$$

Step 2: Sprouting and tuberization.

Sprouting and tuberization are important stages for potato.

$$B \rightarrow I$$

Step 3: Tasseling and silking.

Tasseling and silking are critical stages for maize.

$$C \rightarrow II$$

Step 4: Flowering and pod development.

Flowering and pod development are critical stages for groundnut.

$$D \rightarrow III$$

Therefore:

$$A-IV,\ B-I,\ C-II,\ D-III$$

$\therefore$ Correct Answer is (B)

Quick Tip: Maize is highly sensitive to moisture stress at tasseling and silking stages.

67. Match List-I with List-II.

	List - I Process of field drainage		List - II Terminology of field drainage
A.	The process of changing the natural topography so as to control the movement of water on to surface	I.	Land forming
B.	Flat lands where there are only minor difference in field levels	II.	Land smoothing
C.	The grade in the direction of drains can be 0.05 to 0.5%	III.	Land grading
D.	Suitable for soils with poor conductivity with slopes not exceeding 1.5%	IV.	Bedding system

Choose the **correct** answer from the options given below :

(A) A-II, B-III, C-I, D-IV

(B) A-III, B-II, C-IV, D-I

(C) A-I, B-II, C-III, D-IV

(D) A-IV, B-II, C-III, D-I

Correct Answer: (C) A-I, B-II, C-III, D-IV

Solution:

Concept:

Field drainage operations include land forming, land smoothing, land grading and bedding systems.

Step 1: Land forming.

Changing natural topography to control water movement on the surface is called land forming.

$$A \rightarrow I$$

Step 2: Land smoothing.

Land smoothing is done on flat lands where only minor differences in field levels exist.

$$B \rightarrow II$$

Step 3: Land grading.

Land grading provides a desired grade in the direction of drains, generally 0.05 to 0.5%.

$$C \rightarrow III$$

Step 4: Bedding system.

Bedding system is suitable for soils with poor conductivity and slopes not exceeding 1.5%.

$$D \rightarrow IV$$

Therefore:

$$A-I,\ B-II,\ C-III,\ D-IV$$

$\therefore$ Correct Answer is (C)

Quick Tip: Land forming changes natural topography, while land grading provides a planned field slope for drainage.

---

68. Match List-I with List-II.

	List - I Terminology used in crop water requirement		List - II Detail
A.	Consumptive use	I.	Period during which yield of crop is affected severely due to inadequate moisture
B.	Water requirement	II.	Depth of water required for normal crop production plus leaching and other loss
C.	Irrigation requirement	III.	The water needed for raising a crop in a given period
D.	Critical period	IV.	The quantity of water lost in evaporation, transpiration and that used by the crop in metabolic activities

Choose the **correct** answer from the options given below :

(A) A-II, B-III, C-I, D-IV

(B) A-IV, B-II, C-III, D-I

(C) A-I, B-II, C-III, D-IV

(D) A-IV, B-III, C-II, D-I

Correct Answer: (D) A-IV, B-III, C-II, D-I

Solution:

Concept:

Crop water requirement terms describe water use, irrigation need and sensitive crop growth

stages.

Step 1: Consumptive use.

Consumptive use is the quantity of water lost through evaporation, transpiration and metabolic use by crop.

$$A \rightarrow IV$$

Step 2: Water requirement.

Water requirement means water needed for raising a crop in a given period.

$$B \rightarrow III$$

Step 3: Irrigation requirement.

Irrigation requirement means depth of water required for normal crop production plus leaching and other losses.

$$C \rightarrow II$$

Step 4: Critical period.

Critical period is the period during which yield is severely affected due to inadequate moisture.

$$D \rightarrow I$$

Therefore:

$$A-IV,\ B-III,\ C-II,\ D-I$$

$\therefore$ Correct Answer is (D)

Quick Tip: Consumptive use mainly includes evaporation and transpiration losses from the crop field.

---

69. Match List-I with List-II.

	List - I Process of wind erosion		List - II Terminology of wind erosion
A.	Floating of small size particles in the air stream	I.	Surface creep
B.	Soil particles movement in a series of bounces or jumps	II.	Threshold velocity
C.	Minimum wind velocity required to intitiate the movement of soil particles	III.	Suspension
D.	Rolling or sliding of large soil particles along the ground surface	IV.	Saltation

Choose the **correct** answer from the options given below :

(A) A-II, B-I, C-III, D-IV

(B) A-III, B-IV, C-II, D-I

(C) A-II, B-IV, C-III, D-I

(D) A-I, B-II, C-III, D-IV

Correct Answer: (B) A-III, B-IV, C-II, D-I

Solution:

Concept:

Wind erosion moves soil particles mainly by suspension, saltation and surface creep.

Step 1: Suspension.

Floating of small soil particles in the air stream is called suspension.

$$A \rightarrow III$$

Step 2: Saltation.

Movement of soil particles in a series of bounces or jumps is called saltation.

$$B \rightarrow IV$$

Step 3: Threshold velocity.

Minimum wind velocity needed to initiate soil particle movement is threshold velocity.

$$C \rightarrow II$$

Step 4: Surface creep.

Rolling or sliding of large soil particles along the ground surface is called surface creep.

$$D \rightarrow I$$

Therefore:

$$A-III,\ B-IV,\ C-II,\ D-I$$

$\therefore$ Correct Answer is (B)

Quick Tip: Wind erosion occurs by suspension, saltation and surface creep.

---

70. Match List-I with List-II.

	List - I Terminology use in Remote sensing		List - II Detail
A.	Active sensing	I.	When the sensing device detects EMR originating from another sources primarily from sun
B.	Passive sensing	II.	It is the change in reflectance or emiction of objects as a function of wavelength
C.	Spectral	III.	It is the arrangement of terrain features providing attributes, such as shape, size and feature
D.	Spatial	IV.	When the sensing device defects EMR at an object and detects the amount of that energy which is reflected back

Choose the **correct** answer from the options given below :

(A) A-IV, B-II, C-III, D-I

(B) A-I, B-II, C-III, D-IV

(C) A-III, B-II, C-I, D-IV

(D) A-IV, B-I, C-II, D-III

Correct Answer: (D) A-IV, B-I, C-II, D-III

Solution:

Concept:

Remote sensing may be active or passive, and image interpretation uses spectral and spatial information.

Step 1: Active sensing.

Active sensing sends energy towards an object and detects the reflected energy.

$$A \rightarrow IV$$

Step 2: Passive sensing.

Passive sensing detects natural EMR, mainly from the sun, reflected by objects.

$$B \rightarrow I$$

Step 3: Spectral.

Spectral property refers to change in reflectance or emission with wavelength.

$$C \rightarrow II$$

Step 4: Spatial.

Spatial property relates to arrangement of terrain features such as shape, size and texture.

$$D \rightarrow III$$

Therefore:

$$A-IV,\ B-I,\ C-II,\ D-III$$

$\therefore$ Correct Answer is (D)

Quick Tip: Active sensing uses its own energy source, while passive sensing depends on natural radiation.

---

71. Match List-I with List-II.

	List - I Type of Pump		List - II Detail
A.	Mixed flow pump	I.	The wheel generally resembles the blade element that generates forced vertex flow
B.	Axial flow pump	II.	Pump has high discharge capacity but has low head and limited suction capacity
C.	Centrifugal pump	III.	Pump which does not require any external power for its operation to raise water
D.	Hydraulic Ram	IV.	The inlet and outlet edge of the blades are inclined to the axis of rotation

Choose the **correct** answer from the options given below :

(A) A-III, B-II, C-I, D-IV

(B) A-IV, B-II, C-III, D-I

(C) A-IV, B-II, C-I, D-III

(D) A-II, B-III, C-I, D-IV

Correct Answer: (C) A-IV, B-II, C-I, D-III

Solution:

Concept:

Different pumps are identified by flow direction, impeller design and energy requirement.

Step 1: Mixed flow pump.

In a mixed flow pump, inlet and outlet blade edges are inclined to the axis of rotation.

$$A \rightarrow IV$$

Step 2: Axial flow pump.

Axial flow pump gives high discharge but low head and limited suction capacity.

$$B \rightarrow II$$

Step 3: Centrifugal pump.

Centrifugal pump has an impeller or wheel that generates forced vortex flow.

$$C \rightarrow I$$

Step 4: Hydraulic ram.

Hydraulic ram does not require external power for lifting water.

$$D \rightarrow III$$

Therefore:

$$A-IV,\ B-II,\ C-I,\ D-III$$

$\therefore$ Correct Answer is (C)

Quick Tip: Hydraulic ram uses water hammer effect and does not require external power.

---

72. Match List-I with List-II.

	List - I Process of water movement		List - II Terminology
A.	Downward movement or entry of water into the soil surface	I.	Seepage
B.	The movement of water through a column of soil	II.	Water intake
C.	Downward and lateral movement of water into the soil	III.	Infiltration
D.	Movement of irrigation water from surface into and through the soil	IV.	Percolation

Choose the **correct** answer from the options given below :

(A) A-I, B-III, C-IV, D-II

(B) A-IV, B-III, C-I, D-II

(C) A-III, B-IV, C-I, D-II

(D) A-III, B-I, C-IV, D-II

Correct Answer: (C) A-III, B-IV, C-I, D-II

Solution:

Concept:

Water movement in soil includes infiltration, percolation, seepage and water intake.

Step 1: Infiltration.

Downward movement or entry of water into the soil surface is infiltration.

$$A \rightarrow III$$

Step 2: Percolation.

Movement of water through a column of soil is percolation.

$$B \rightarrow IV$$

Step 3: Seepage.

Downward and lateral movement of water into soil is seepage.

$$C \rightarrow I$$

Step 4: Water intake.

Movement of irrigation water from surface into and through the soil is water intake.

$$D \rightarrow II$$

Therefore:

$$A-III,\ B-IV,\ C-I,\ D-II$$

$\therefore$ Correct Answer is (C)

Quick Tip: Infiltration is entry into the soil surface, while percolation is movement through the soil profile.

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73. Match List-I with List-II.

	List - I Terminology/devise		List - II Detail
A.	Tensiometer	I.	Portion of water potential that results from the solute present in the soil system
B.	Osmotic potential	II.	The level at which the water stands in a well before pumping starts
C.	Static water level	III.	Line joining equal of elevation point of the field
D.	Contour	IV.	Soil moisture content

Choose the **correct** answer from the options given below :

(A) A-II, B-I, C-III, D-IV

(B) A-IV, B-II, C-I, D-III

(C) A-I, B-II, C-III, D-IV

(D) A-IV, B-I, C-II, D-III

Correct Answer: (D) A-IV, B-I, C-II, D-III

Solution:

Concept:

This matching question is based on soil water and field survey terminology.

Step 1: Tensiometer.

Tensiometer is used in relation to soil moisture condition.

$$A \rightarrow IV$$

Step 2: Osmotic potential.

Osmotic potential is the part of water potential due to solutes present in the soil solution.

$$B \rightarrow I$$

Step 3: Static water level.

Static water level is the level at which water stands in a well before pumping starts.

$$C \rightarrow II$$

Step 4: Contour.

Contour is a line joining points of equal elevation.

$$D \rightarrow III$$

Therefore:

$$A-IV,\ B-I,\ C-II,\ D-III$$

∴ Correct Answer is (D)

Quick Tip: A contour line joins points of equal elevation, while static water level is measured before pumping starts.

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74. Match List-I with List-II.

	List - I Soil Property		List - II Detail/Process
A.	Porosity	I.	The ratio of volume of pores to the total soil volume
B.	Potential flow	II.	The irrotational and steady flow
C.	Soil moisture tension	III.	The tenacity of soil by which water is retained in it
D.	Water balance	IV.	Hydrological balance between rainfall and irrigation that change the soil moisture

Choose the **correct** answer from the options given below :

(A) A-I, B-II, C-III, D-IV

(B) A-II, B-III, C-IV, D-I

(C) A-III, B-IV, C-I, D-II

(D) A-IV, B-I, C-II, D-III

Correct Answer: (A) A-I, B-II, C-III, D-IV

Solution:

Concept:

Soil physical properties and hydrological terms describe pore space, flow, water retention and water balance.

Step 1: Porosity.

Porosity is the ratio of volume of pores to the total soil volume.

$$A \rightarrow I$$

Step 2: Potential flow.

Potential flow is generally considered irrotational and steady flow.

$$B \rightarrow II$$

Step 3: Soil moisture tension.

Soil moisture tension is the force or tenacity with which soil retains water.

$$C \rightarrow III$$

Step 4: Water balance.

Water balance represents the hydrological balance between rainfall, irrigation and changes in soil moisture.

$$D \rightarrow IV$$

Therefore:

$$A-I,\ B-II,\ C-III,\ D-IV$$

$\therefore$ Correct Answer is (A)

Quick Tip: Porosity means pore volume divided by total soil volume.

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75. Match List-I with List-II.

	List - I Soil Conservation entities		List - II Discription
A.	Land grading	I.	Derived by plotting the rainfall intensity and time
B.	Land utilization index	II.	Plotting the discharge and corresponding time data
C.	Hydrograph	III.	Process of land modification under which field surface is reshaped to a desired slope and elevation
D.	Hyetograph	IV.	The number of days in a year during which the crops occupy the land divided by 365

Choose the **correct** answer from the options given below :

(A) A-I, B-II, C-III, D-IV

(B) A-II, B-III, C-I, D-IV

(C) A-IV, B-II, C-III, D-I

(D) A-III, B-IV, C-II, D-I

Correct Answer: (D) A-III, B-IV, C-II, D-I

Solution:

Concept:

This question is based on basic soil conservation and hydrology terms.

Step 1: Land grading.

Land grading is the process of reshaping the field surface to a desired slope and elevation.

$$A \rightarrow III$$

Step 2: Land utilization index.

Land utilization index is the number of days in a year during which crops occupy the land divided by 365.

$$B \rightarrow IV$$

Step 3: Hydrograph.

Hydrograph is obtained by plotting discharge against corresponding time.

$$C \rightarrow II$$

Step 4: Hyetograph.

Hyetograph is obtained by plotting rainfall intensity against time.

$$D \rightarrow I$$

Therefore:

$$A-III,\ B-IV,\ C-II,\ D-I$$

$\therefore$ Correct Answer is (D)

Quick Tip: Hydrograph shows discharge versus time, while hyetograph shows rainfall intensity versus time.
