SOILS IN INDIA

→ Soil is the thin, uppermost layer of earth's crust. It supports all forests, grasslands and crops which support life. It consists of fine particles composed of silica, clay, chalk and humus.

- **Evolution of soil** is affected by forces of nature such as changing temperature, running water, wind, along with chemical and organic changes taking place in soil.
- **Soil Fertility** is the power of the soil to support plant life
- **Humus** is the fine vegetal and animal remains which add to the fertility of the soil.

Characteristics of Fertile Soil:

- It has sufficient depth to allow aeration of roots which allows full root development
- It has sufficient quantities of moisture to supply adequate nutrition to plants.
- It should contain adequate quantity of humus.
- Fertility can be improved by adding fertilizers make up for the missing nutrients.

Type of soil	Formation of soil	Occurrence/States where they occur	Composition of soil	Characteristic features of Soil	Crops grown in soil
Alluvial	By silt deposition brought by rivers	River valleys, deltas of rivers and coastal strips of Peninsular India Punjab, Haryana, Uttar Pradesh, Bihar Jharkhand and West Bengal	Yellow in colour Rich in potash and lime but deficient in nitrogen, phosphoric acid and humus.(The Ganga delta is rich in humus)	In texture, it is coarse in upper region medium in middle region and fine in the lower region There is two types of Alluvial Soils (i) Bhangar (old) (ii) Khadar (new)	Wheat, rice sugarcane, cotton jute and oil – seeds.
Black	By weathering of lava– flow rocks	Deccan Plateau, valleys of Krishna and Godavari Maharashtra, Gujarat, Andhra Pradesh, M.P., Chhattisgarh, and Tamil Nadu	Colour: Black / Chestnut brown Rich in iron, lime, aluminium, potash, magnesium, calcium It lacks in nitrogen, phosphorous and humus	When wet it is fine grained, moisture retentive and sticky Cracks and crevices develop when it is dry	Sugarcane, cotton jowar, tobacco wheat, and oil – seeds
Red	By decomposition of old crystalline or metamorphic rocks	Eastern parts of Deccan Plateau. Tamil Nadu, Goa, south Karnataka, Orissa and Meghalaya	Red in colour because its high iron oxide Rich in iron and deficient in lime, nitrogen, potash phosphorus and humus of	Acidic, porous and coarse	Wheat, rice cotton sugarcane and pulse (with the use of fertilizers)
Laterite	By weathering of rocks under monsoon climatic conditions such as heavy rainfall and high temperature with alternating wet and dry periods.	In patches in the Eastern and Western Ghats and Assam hills. Andhra Pradesh Tamil Nadu, West Bengal and Orissa	Rich in iron, and poor in silica, lime, nitrogen and humus	Highly acidic, porous crumbly and coarse	Tea, coffee, rubber cashew, tapioca and millets
Desert	By weathering of rocks due to high diurnal range of temperatures and dryness	West and north – west of India Rajasthan, north Gujarat and southern Punjab	Rich in salts and deficient in organic matter	Loose, porous and Coarse	Generally, unsuitable for cultivation but with irrigation useful for wheat, gram bajra, melon etc.
Mountain	By weathering of sedimentary rocks	Hills of Jammu and Kashmir Slopes of mountains in Uttaranchal, Assam hills and West Bengal	Rich in iron and deficient in lime	Acidic coarse, porous and thin	With fertilizers tea plantation fruits and medicinal plants

Soil Profile:

- Soil consists of two major layers:
  - Top soil
  - Sub soil

Top–Soil

- Top–soil is the most important layer of the soil since it contains humus. It contains all kinds of bacteria, insects and decayed plant life. It takes years to form top–soil but gets easily washed.

Sub–Soil:

- Sub–soil is the next layer below, consisting of parent materials which are further reduced to form soil. It also contains moisture, mineral constituents but no humus. Below this layer is the **solid rock materials**

Soil Classification:

- According to the **formation**, soil can be categorized as:
  - **Residual Soil or 'In Situ':** These are found where they are formed e.g. Black soils
- **Transported Soil:** These soils are carried down by the agents of gradation like rivers and winds: eg. Alluvial soils.

Soil Erosion:

- Soil erosion is the detachment and transportation of soil by agents of denudation such as weathering running water and wind.

Types of Soil Erosion:

- **Soil erosion by water:** The main factor for soil erosion is running water. This includes; sheet erosion, gully erosion, rill erosion, leaching, sea or shore erosion, stream bank erosion, slip erosion.
- **Sheet erosion:** When there are torrential downpour of rain in hilly regions such as the Himalayas, hills of north–east India and the Nilgiris, the steep slopes stimulate the erosive power of the rain causing sheet erosion over vast stretches of land. On the plains, which are more or less level, the speed is slower and erosion is comparatively much less. However, where rivers overflow their banks and flood the surrounding plains, as in the case of the rivers Brahmaputra (Assam), Kosi (Bihar) and Chambal (Rajasthan, Damodar and Ganga (West Bengal), the damage done to the soil is tremendous, resulting in rugged topography. In fact, heavy rainfall is more destructive than the same amount of precipitation spread over a longer period.
- **Gully Erosion:** Gully erosion takes place when water runs down or gushes in distinct paths, forming rills, which deepen to form ravines or gullies leading down to the bedrock. This gully erosion creates areas of 'badlands' which cannot be put to any use till soil restoration takes place. Such a type of gully erosion is prevalent in the plateau country, especially the Chambal valley.
  - **Soil erosion by wind:** Wind is the most powerful agent of soil erosion in desert and semi– desert regions where there is little or no vegetation.
  - Soil erosion due to human action:
    - Deforestation, construction, ploughing, and overgrazing by cattle causes removal of vegetation cover leading to soil erosion.

Soil Erosion in India:

Causes:

- **Increasing population:** More forests are being destroyed for construction of houses and to feed the increasing population.
- **Nature of rainfall:** Heavy downpours during monsoon months and droughts in the remaining months of a year affect the soil. Sudden heavy rainfall after a prolonged dry spell causes sheet erosion.
- **Overgrazing:** The excessive grazing by cattle has resulted in the exposure of the topsoil to the elements of

denudation. Due to overgrazing, wind erosion occurs as the soil devoid of vegetation is directly exposed to the wind.

- **Improper farming techniques:** Improper farming techniques such as absence of terracing, contour cultivation, crop rotation and the improper use of chemical fertilizers etc. have caused soil erosion.
- **Topography:** In hilly regions, steep slopes stimulate the eroding capacity of the rain water due to gravitational force.
- **Deforestation:** The removal of forests and natural vegetation for human needs are also responsible for soil erosion. Cutting of trees exposes the soil to water and wind which lead to soil erosion.

Effects:

- Gradual loss of soil fertility and agricultural productivity.
- Lowering of the underground water table.
- Extension of arid lands, increase in drought and flood frequency.
- Recurrence of landslides, silting of river beds.

Regions:

- The worst affected regions are:
  - The badlands of the Chambal and Yamuna rivers
  - The Piedmont zone of the western Himalayas
  - The Chhotanagpur plateau region
  - The Tapi–Sabarmati valley region in Gujarat
  - The regur soil area of Maharashtra and
  - The dry areas of Rajasthan, Gujarat and Haryana

Soil Conservation:

- Soil conservation is an effort made by man to reduce the rate of destructive erosion of soil by taking preventive measures.
- Some of the measures taken for soil conservation are:
  - Terrace farming, shelter belts, contour ploughing, strip cropping, construction of dams, ploughing gullies and afforestation.
  - Various schemes implemented by the government along with Indians forest policy are:
    - Dryland development through an irrigation network.
    - Integrated Watershed Management.
    - Drought Prone Area Programme (DPAP)
    - Rural development.
    - Agro – forestry
    - Controlling shifting agriculture.
    - Reclamation and development of ravine areas.
    - Awareness campaigns for ecological programmes, protection of mountain ecosystems.

Difference Between:

1) Differentiate between Khadar and Bhangar soils:

Ans:

Khadar soil	Bhangar soil
Khadar is the newer alluvium	Bhangar is the old alluvium
Found in the lower beds in the valleys near the rivers.	Found about 30 m above sea level in river terraces.

It is light coloured, non–porous clayey and loamy in the river valleys and sandy in the deltaic region. It is finer (contains sand & clay)	It is dark grey in colour and comprises of calcareous clay. It is coarser and has Kankar granules.
It is more fertile as the soil is replenished by deposition during monsoonal floods.	It is less fertile as it is not renewed. However, crops can be grown using manure

2) Distinguish between soils eroded by the action of wind and the action of water.

Ans:

Action of Wind	Action of Water
Wind erosion removes the loose sand and topsoil, which is carried to a great distance	It causes run off resulting in removal of top soil or formation of deeper gullies.
It may carry sand from the arid land and deposit it on the fertile land, rendering it infertile	Water erosion washes away the nutrients of the soil which is necessary for crops, thus rendering the land unproductive.
Wind erosion takes place during the dry season	Erosion by water is prevalent during heavy rains only

QUESTIONS AND ANSWERS:

1) State the factors which contribute to the evolution of soil.

Ans: Various forces of nature such as changing temperature, running water and wind affect soil formation. These forces of nature along with chemical and organic changes that take place in the soil contribute to the evolution of soil. Thus soil evolves in texture and composition over thousands of years.

2) What do you understand by *humus*?

Ans: **Humus** is the organic matter formed by the decomposition of vegetal and animal remains. Humus content determines the fertility of soil.

3) Differentiate between sheet erosion and gully erosion.

Ans: **Sheet erosion** takes place on gentle slopes due to rain water. It is a slow removal of a thin layer of top soil. It occurs over vast areas of bare land where vegetation has been destroyed.

Gully erosion occurs during heavy downpour

Running water etches out deep gullies creating a badland topography, in an otherwise normal landscape. It removes heavy load of loose soils making the soil unproductive.

4) Define leaching, in which region, south of the Tropic of cancer can one find soil formed by Leaching?

Ans: Leaching is a form of soil erosion by water, which occurs due to heavy rain. It is the movement of the organic matter and mineral salts from the upper layers of the soil into the lowers layers because of percolation of rain water.

Laterite soils, formed by leaching are found in the highland areas of peninsular mountains, the Western and Eastern Ghats.

5) Explain the following terms (i) Badlands (ii) Deforestation

Ans: i) **Badlands:** Large areas of agricultural land (in states of Uttar Pradesh, Madhya Pradesh, Rajasthan and Gujarat) are transformed into ravines and gullies due to the action of running water. The removal of top soil leaves the land unproductive. These are called badlands.

ii) **Deforestation:** Cutting of trees exposes the soil to water and wind which leads to soil erosion. Forests are destroyed recklessly in order to bring new lands under agriculture.

6) Differentiate between soil conservation and soil erosion

Ans: i) Soil erosion is the removal of soil by running water and wind as well as by human activities, while soil conservation is an effort by man to reduce soil erosion.

ii) The rate of soil erosion increases due to deforestation, improper farming techniques and overgrazing of land by animals.

Soil can be conserved by afforestation, using proper farming techniques and restricted grazing of animals.

7) Explain how the soil erosion in the Thar Desert affects the fertile Gangetic plain.

Ans: The Thar Desert is a dry, arid region affected by wind erosion. Wind carries sand from the Thar Desert and deposits it over the fertile soil areas rendering them infertile.

The winds blow in an eastward direction towards the western Gangetic plain, during the dry months. The desert region is reported to be advancing towards the western Gangetic plain.

8) Why is there a need for soil conservation in India? Give two reasons.

Ans: In India the degradation of soil is most critical due to the following reasons:

i) The land of the northern plains has been ploughed for over thousands of years with demand from it increasing rapidly. The southern plateau region being the oldest landmass, the rocks are eroded and exposed.

ii) There are heavy monsoon floods in many parts of India. In some parts the underground water is dependent on conduction of the soil and the water table is getting lower.

Soil conservation is needed to prevent desertification and ensure better ecological balance.

9) How can forest land be protected from erosion? Give two aspects.

Ans: i) Soil erosion is common in India, due to running water, winds, etc. The forest land has to be protected. Thus afforestation is the best way to prevent soil erosion as also, to increase area under forests. Indiscriminate felling of trees must stop.

ii) Overgrazing of forests and grasslands by animals, especially goats and sheep must be checked. Separate grazing grounds should be provided. Also belts of trees and shrubs should be planted to check the wind velocity and prevent wind erosion.

Section II: [3 Marks]

10) State any three factors that influence soil formation.

Ans: i) Soil is the loose material which forms the thin surface layer of the earth. Its formation is related to parent rock material like black soil or regur. These soils are found 'in Situ' i.e. formed where they are found. The parent rock has originated from the Deccan Plateau during volcanic activity. So, weathering of the Deccan trap forms this soil.

ii) **Soils formed due to relief:** The mountain and hill soils are formed due to the relief features and due to denudation as well as disintegration of rocks in mountains because of landslides.

iii) **Climate and vegetation:** The soils formed under climatic conditions are laterite soils. These soils are formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods. Thus, its formation takes place under monsoon conditions.

11) What do you understand by soil fertility? State the characteristics of fertile soil

Ans: Fertility of a soil is the power of the soil to support plant life. It is determined by the humus content and chemical composition of the soil.

Characteristics of fertile soil:

i) It has sufficient depth to allow aeration and full development of roots.

ii) It has sufficient quantities of moisture. It should be able to supply adequate nutrition to the plant.

iii) It should contain adequate quantity of humus.

12) Place in two broad categories the soils of India on the basis of their formation

Ans: Two broad categories of soil found in India are:

i) **Residual soil:** These are found where they are formed. They are thus called 'in situ' soils. Such soils are formed by weathering of the parent rock in the same place
Eg. Red soil, black soil

ii) **Transported soil:** These soils are carried down by agents of gradation like rivers and winds.
Eg. Alluvial soils.

13) Explain the following terms (i) Parent rock, ii) Soil profile, iii) loam.

Ans: i) **Parent rock:** It is the original or residual matter i.e. the bedrock from which the material of the soil is formed. Through the process of break–up or wear and tear, disintegration of parent rock forms soil. The main mineral matter or characteristic of soil is formed from the parent rock.

ii) **Soil Profile:** A soil profile is a section showing the successive layers of the soil which would appear if you cut straight down into the soil. The soil consists of two layers as per its profile. This is the vertical cross section of a soil that displays the various horizons or soil layers. Soil profile has been classified as follows:
a) **Top soil**–the plant growth layer b) **Sub soil**– the weathering of parent rock

iii) **Loam:** Alluvial soil is a mixture of sand, silt and clay called loam. They are found near the river beds, neither very close to nor very high from the river level.

14) Differentiate between the alluvial soil of the Ganga valley and the alluvial soil of the Deccan coastal strip.

Ans: **The alluvial soil of the Upper Ganga valley** is dry porous, sandy, faint yellow in colour, while it is more compact in the lower course.

It is rich in potash, humus and lime.

The **Coastal alluvium** found in the Deccan coastal strip is non–porous, clayey, and darker in colour. The Deccan Rivers flow through the region of black regur soil, carrying this alluvium to the delta, thus giving it the dark colour.

It is deficient in nitrogen and humus.

15) Give two characteristic features of the soil found most suitable for growing cotton and sugarcane in Maharashtra.

Ans: **Black Cotton soil** is most suitable for growing **cotton** and **sugarcane.**

Black soil or regur is found in the Deccan trap comprising a large part of Maharashtra.

Characteristics:

i) It is fine textured, clayey and rich in lime, potash, calcium and magnesium carbonates, and in iron content.

ii) It is highly moisture retentive and becomes sticky when wet. On getting dry it forms long and deep cracks and crevices which help in air circulation. The property of holding moisture which is released to the plants during the dry periods is extremely useful in the unirrigated lava tracts of Maharashtra. The deeper the soil the greater is the moisture held.

iii) The soil is very fertile even without manuring. These features make the soil suitable for growing cotton and sugarcane in Maharashtra.

16) i) Name the soil formed due to atmospheric weathering

ii) State the conditions under which they are formed?

iii) Name two states where this type of soil is found

Ans: i) **Laterite soil** is formed as a result of atmospheric weathering of lateritic rocks.

ii) The minerals of the top soil get washed away due to excessive heat, heavy rainfall and alternating wet and dry periods. Under these conditions the laterite soil is formed.

iii) They are found in patches in the highland areas of Peninsular Plateau. The states are, Madhya Pradesh, Orissa, Maharashtra, West Bengal, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

17) i) State the characteristics of laterite soils.

ii) Why is laterite soil unsuitable for agriculture?

Ans: i) Laterite soil is **coarse** in texture, **soft** and **friable.**

- It is red due to the presence of iron oxide which is formed by leaching
- The soluble plant foods are removed from the top soil leaving alumina and iron oxide.
- It is porous, from which silica is removed by chemical action.
- It is poor in lime and magnesium and deficient in nitrogen.
- It is acidic in nature as alkalis are leached.
- It is suited for cultivation of special crops such as tapioca, cashew nuts etc.

ii) Laterite soil has high acid content and low moisture retention which makes it unsuitable for agricultural purposes. The soluble plant food is washed from the top soil leaving the soil devoid of nutrition. Cultivation of Tea, Coffee, Cashew nuts and Tapioca is possible with the use of fertilizers.

18) Name the soil type formed from crystalline rocks. State the conditions of formation of these soils and the states where they are found.

Ans: Red soil is formed from crystalline rocks. It is 'in situ', formed from the parent rock. Red soil is formed by prolonged weathering by rainfall of ancient crystalline rocks of the Peninsular plateau.

The colour and composition differs from place to place depending on the parent rock material and climatic conditions.

Red soil is found in Tamil Nadu, Southern Karnataka, Goa, North–eastern Andhra Pradesh, Madhya Pradesh and Orissa.

19) Give three reasons for the low fertility of Red soils.

Ans: Red soils are less fertile as,

i) They lack nitrogenous, phosphorous and organic matter

ii) In the uplands it possesses loose gravel which is less fertile.

iii) The coarse grains lack sustenance of fertility. They are porous and do not retain moisture.

20) i) Name the type of soil found in the Nilgiri Hills.

ii) Name the crop grown in this region.

iii) State the soil characteristics which support the crop mentioned.

Ans: i) The Nilgiri Hills in south India have mountain soils. The characteristics of the soil changes according to the altitude.

ii) Tea is the main crop of this region. Tea plantations are widespread on the hill slopes which have suitable climatic and soil conditions.

iii) The mountain soil is rich in iron and humus due to the forest cover. It is deficient in lime and potash. The stagnant water near the roots of the tea plants drain off due to the slope of the land. This makes the soils suitable for tea cultivation in the Nilgiri Hills. Tea plantations are also prominent in the hill slopes of Eastern Himalayas.

21) i) What are desert soils?

ii) Where are desert soils found?

iii) What are its characteristics?

Ans: i) Desert soils are arid, sandy soils as well as windblown loess. They are formed as a result of wear and tear as well as mechanical weathering of rocks in deserts where there is hot and dry climate.

ii) Desert soils are found in the arid zone in the north–western part of the country, i.e. in Rajasthan (Districts of Bikaner, Ganganagari, Barmer, Jaisalmer, Jodhpur, Churu and Jalore), in Gujarat (Kutch region) and South Punjab.

iii) Characteristics:

- Desert soils are coarse, brown in colour, because the top soils has been blown away by wind
- They are porous with low water retention capacity.
- They contain high soluble salts and often soluble organic matter.
- They are deficient in nitrogen and humus content and are not suitable for agriculture.

22) i) Name one soil of volcanic origin found in India. State the regions where they are found.

ii) Name the minerals found in this soil.

iii) Name one important crop grown on this soil.

Ans: i) Black soil known as Regur or Black cotton soil are formed from the weathering of volcanic rocks. They are found in the Deccan trap, comprising of Maharashtra, Andhra Pradesh, southern Tamil Nadu, parts of Gujarat and Madhya Pradesh.

ii) It is rich in iron, aluminium, calcium, potash, lime and magnesium.

iii) The most important crop grown in black soil is cotton (and sugarcane), due to its self ploughing and moisture retaining characteristics.

23) Name the following:

i) The soil found most suitable for growing coffee in Karnataka.

ii) The type of soil found in the summit of the Eastern Ghats.

iii) Name one crop widely grown on alluvial soil.

Ans: i) In Karnataka laterite soil is most suitable for growing coffee.

ii) Laterite soil is found on the summit of the Eastern Ghats.

iii) Wheat rice is widely grown on alluvial soil.

24) Name the soils which are:

i) Rich in iron but poor in silica, ii) rich in humus; iii) rich in potash but poor in phosphorous iv) Rich in soluble salts but poor in organic matter

Ans: i) Laterite soil, ii) Alluvial soil of Ganga Delta, iii) Alluvial soil, iv) Desert soil.

25) Name two important crops cultivated in (i) Red soil; (ii) Desert soil; (iii) laterite soil; (iv) mountain soil; (v) Deltaic alluvium

Ans: i) Wheat, rice, gram, pulses, sugarcane.

ii) Barley, bajra, melons, wheat with irrigation.

iii) Coffee, tapioca, cashew, rubber.

iv) Tea, coffee, medicinal plants.

v) Rice, Jute.

26) Give reasons for the following:

i) Alluvial soils are also called Riverine soil.

Ans: Alluvial soils are formed by the sediments brought down by the rivers and deposited on the flood plains. They are also known as riverine soil because they are mainly found in the river basins.

ii) Leached soils are red in colour.

Ans: Leaching is the movement of organic matter and mineral salts from the upper layers of the soil into lower layers because of percolation of rain water. The iron oxide formed in the process imparts the red colour to the soil.

iii) Deltaic alluvium is more fertile than coastal alluvium.

Ans: The deltaic alluvium is rich in nitrogen and humus. It is fine in texture, compact and more moist. It is mainly new alluvium which is newly enriched by deposits brought down by the rivers. This makes deltaic alluvium very fertile. Coastal alluvium on the other hand consists of sand and clay and is non porous. It lacks humus and nitrogenous compounds making it less fertile.

27) Name the type of soil found in the following places.

i) The arid parts of the Gangetic plain.

ii) The western part of Andhra Pradesh.

iii) The coastal strip of Peninsular India.

Ans: i) **The arid parts of the Gangetic Plains:** The older alluvial soils also known as Bhangar soil. They are coarse in nature and contain 'Kankar', pebbles and gravel.

ii) **The western part of Andhra Pradesh:** The soils found here are Black or Regur soils. They are rich, volcanic soils.

iii) **The coastal strips of Peninsular India:** These have coastal alluvium or Khadar. They are new soils, flooded almost every year.

28) What do you understand by the following terms:

i) Soil erosion ii) Gully erosion iii) Sheet erosion iv) Rill erosion

Ans: **i) Soil erosion:** The removal of the top soil cover, either as single particles or 'en masse' by water, wind and human activities is called soil – erosion.

ii) **Gully erosion:** When the bare soil is eroded by water flowing along definite paths downs the slope or in channels, it is called gully erosion. Gully erosion removes nutrients and heavy load of loose soils making the soil unproductive and the water muddy. It is common in the Chambal Valley region.

iii) **Sheet erosion:** It occurs on gentle slopes due to the slow removal of a thin layer of soil when vegetation is destroyed. Rainwater washes away the thin layer of bare soil.

iv) **Rill erosion:** Small streams start downward cutting of soil. Finger like rills appear on the surface due to the flow of water.

29) State three natural regions which are affected by soil erosion.

Ans: i) The prime factor of soil erosion is running water. The soils are washed away due to Gully or Rill erosion. The water flows with force downhill developing into a channel flow, as seen in laterite soils or in the **mountain regions.**

ii) Wind erosion occurs in sandy **desert region** where winds blow across the extensive flat land devoid of vegetative cover. The upper layers become loose, and susceptible to wind erosion due to lack of moisture.

iii) Faulty methods of agriculture practice lead to soil erosion like the practice of shifting agriculture or Jhumming practiced in the **northeast of India**. The soil loses its fertility.

30) What are the causes of soil erosion in the following regions?

i) Flood plains of Ganga and Yamuna ii) Siwaliks or Outer Himalayas

iii) North–eastern parts of India iv) Arid region of western India

v) Hilly areas of South India.

Ans: **i) Flood Plains of Ganga and Yamuna:** Stream Bank Erosion is prevalent in the flood plains of the Ganga and Yamuna. Banks of streams and rivers get severely eroded by fast flowing flood waters. The streams and rivers often change their course and thus their beds get widened.

ii) Siwaliks or Outer Himalayas: Destruction of vegetation cover due to deforestation by man has left the soil bare and loose. Heavy monsoon rain has caused sheet, rill and gully erosion along the steep slopes. The local population practice shifting cultivation. Heavy rains wash away the bare soil from the slopes to the valleys below.

iii) North Eastern parts of India: Heavy rains and frequent floods cause stream–bank erosion in Assam, West Bengal, and hilly regions of North – east. The rivers, Ganga, Brahmaputra and its tributaries cause erosion of the river banks due to flooding caused by heavy rains.

iv) Arid regions of western India: Rajasthan and southern Punjab are subjected to severe soil erosion due to winds blowing from the Thar Desert. Loose sand in the form of dust is lifted and carried to a great distance by the wind. Due to removal of grass cover wind erosion removes the top–soil.

v) Hilly areas of the south: In the hilly region of the South, the Deccan and the Nilgiris, soil erosion has been caused due to steep slopes, defective methods of cultivation and heavy rainfall. Leaching is common in these regions.

31) Where is plugging and ravine development practiced? How is it practiced?

Ans: Soil conservation methods are an effort made by man to reduce the rate of destruction caused by erosion of

soil. This is done by taking preventive measures.

i) Plugging is practiced in regions with heavy rainfall. The soil is washed away in gullies. These gullies made in the soil are plugged with the deposition of silt during heavy rains.

ii) The government launched a scheme for reclamation and development of ravine areas. The areas of ravines are Madhya Pradesh, Uttar Pradesh, Rajasthan, and Gujarat. The components such as peripheral bunding to halt further ingress of ravines, tableland treatment and afforestation of ravines and reclamation of shallow ravines were practiced.

32) Why is rural development an essential requirement for soil conservation in India? Give three reasons.

Ans: Rural development is very essential for soil conservation,

i) In India there is heavy pressure on land due to increase in population. In the villages the agricultural land gets fragmented. Also forests are being destroyed to feed the increasing population.

ii) Overgrazing: The number of domestic animals i.e. cattle are high. They freely graze in open lands making them bare of vegetation. In many parts of Rajasthan excessive grazing has resulted in exposure of the top soil to denudation.

iii) Bad farming techniques: The poor farmers plough fields in traditional ways. The small size of land holding leads to soil erosion. Absence of terracing, contour cultivation, crop rotation and improper use of manure and poor farming techniques leads to an undeveloped rural set up.

33) i) Name the type of soil widely distributed over the Ganga plain

ii) State the main characteristics of this soil type.

iii) Name the crops grown in this region.

Ans: i) The soils found in the Ganga plain are **alluvial soils**.

They are the inland alluvium, formed by the sediments brought down by the Ganga and its tributaries. They form the largest and most important group of soils as they are very fertile and contribute to the largest share of agriculture produce.

ii) **Characteristics of Alluvial soil:** It is a transported soil. It is formed by the deposition of river load as it flows from the upper to the lower course.

- Soil particles are coarser in the upper section, medium in the middle section and finer in the lower sections of the river course. They are found to a depth of 500 meters.
- The soils of Upper Ganga valley are dry, porous, sandy, faint yellow and consists of clay and organic matter.
- The soil of the Lower Ganga valleys are more compact, less coarse and more moist.
- The soil is rich in potash, humus and lime.
- Deficient in nitrogen, tends to be phosphoric.

iii) The crops grown in this region are rice, wheat, sugarcane, cotton, tobacco, gram and oil– seeds. In the lower Ganga–Brahmputra valley they are useful for jute cultivation.

34) a) Which soil is affected by leaching and why is this disadvantage?

b) How can forest land be protected from erosion? Give two aspects.

c) Explain the terms: (i) Weathered rock (ii) Bed rock (iii) Exfoliated rock.

d) With regard to red soil, where is it found and what are its advantages and disadvantages?

Ans: a) i) Laterite soil is formed by the weathering of laterite rocks. The minerals of the top soil get washed down due to excessive heat and rainfall. This process is known as leaching. The organic matter and mineral salts from the upper layers percolates to the lower layers.

ii) The disadvantage of these soils are that they are generally coarse in texture and friable. They are poor in lime, magnesium, phosphoric acid and potash. Due to intensive leaching, laterite soils lack fertility. They respond to manures. In some areas these soils support grazing grounds and scrub forests.

b) i) Soil erosion is common in India due to running water, winds, etc. The forest land has to be protected. Thus afforestation is the best way to prevent soil erosion. Indiscriminate felling of trees must stop to increase area under forests.

ii) Overgrazing of forests and grasslands by animals, specially goats and sheep, must be checked. Separate grazing grounds should be provided. Also belts of trees and shrubs should be planted to check the wind velocity and prevent wind erosion.

c) i) **Weathered rock:** It is the process by which rocks are decomposed or disintegrated by chemical means, due to exposure at or near the earth's surface. These fragments help in soil formation.

ii) **Bed Rock:** The solid rock underlying soils and exposed at the surface, without a cover. It can also be solid rock layers of the earth's crust that underlying soil and other unconsolidated earth material.

iii) **Exfoliated rock:** The peeling off of the concentric slabs or sheets from the exposed portions of massive

rocks due to weathering are exfoliated rock. This generally happens in the igneous rocks that are exposed to sun. It is caused by the expansion of rock due to erosion.

d) i) Red soils-are found in most parts of Tamil Nadu, Karnataka and Andhra Pradesh.
   ii) This soil is light in texture, with a high iron content. The soils are porous and friable in nature. They are rich in potash and lime and contain soluble salt in a small quantity. They become fertile with proper use of fertilizers and irrigation. It is suited for dry farming.
   iii) Disadvantages-They are thin and light coloured in highlands and thicker and darker in valleys. They are loose gravel or loamy. The soils are deficient in nitrogen, phosphoric acid, magnesia and humus.

35) Explain the methods of soil conservation used to prevent (i) erosion by water, (ii) erosion by wind.

Ans: Following are some of the measures taken to conserve soils.

Erosion by water can be prevented by:

i) **Terrace Farming:** On hilly slopes, terraces act as bunds and do not allow the soil being washed away by running water. Terrace farming is practiced with successful results in Japan, South-East Asia and U S A.
ii) **Contour Ploughing:** Ploughing along contours on a slope prevents soil being washed away by rainwater or by surface run off. Contours act like bunds. Terraces are levelled into step- like small fields with even slope. Contour ploughing is common in Japan, China and some South-East Asian countries.
iii) **Construction of dams**: Rivers cause soil erosion. Dams are built in the upper course of rivers to control erosion of soil.
iv) **Plugging Gullies:** The gullies made in the soil are plugged with deposition of silt during heavy rains.
v) **Planting Trees:** The trees, like in the case of Shelter Belts in Prairies, are planted along the edges of the fields, the waste land and on steep slopes to prevent soil erosion as well as to enhance the capacity of the soil to retain water.

Erosion by wind:

i) **Shelter Belts:** In the Prairie grasslands of U S A farmers plant trees in several rows to check wind erosion. They are known as wind breakers in the Prairies.
ii) **Strip Cropping:** Crops are grown in alternate strips of land to check the impact of the winds.

36) What are the main objectives of the soil conservation programmes?

Ans: The main objectives of the schemes in general are:

i) To slow down the process of erosion and land degradation;
ii) To restore degraded lands;
iii) To improve and ensure availability of water and soil moisture;
iv) To ensure regeneration, enhancing of internal fertility of soil through organic recycle;
v) To enlarge effective productive exploitation zone to the deeper soil profile by mixed farming system;
vi) To increase aggregate bio-mass production;
vii) To ensure collective security against recurring droughts and floods.

The programmes under the State Plan aim at conservation of soil mainly on agricultural lands with some components of land reclamation, soil and land use survey, raising of utility trees on private and common lands.

MISCELLEOUS QUESTIONS

1) Give two characteristic features of the soil found most suitable for growing cotton and sugarcane in Maharashtra.
2) Which soil is suitable for growing coffee in Karnataka?
3) What are laterite soils? Why is laterite soil unsuitable for agriculture?
4) How were the soils of Gangetic Plains formed?
5) Name any four types for soils in India. Which one of them is the most important for agriculture?
6) Name the States in which black soils are found.
7) How were the laterite soils formed? Name one important crop grown on laterite soil.
8) How are alluvial soils formed?
9) Which minerals are found in regur soil? Name the most important crop grown on it.
10) Name one soil of volcanic origin commonly found in India. Name one crop widely grown on this soil.

PREVIOUS YEARS QUESTIONS:

1) State two methods of soil conservation [99, 2006]
2) State two disadvantages of the red soil. [2000]
3) How does the soil of the Ganga–Yamuna plain differ from that of central Maharashtra? [2000]

4) Name the state in India which mostly has red soil [2000, 2001]
5) Name the soil known for its self-ploughing quality and capacity to hold moisture. Name one cash crop for which it is most suited. [2001]
6) What is the advantage of 'clay' contents in black soils? [2002]
7) How was black soil or regur soil formed? Where is this soil found in India? [2002, 05, 07]
8) State two main differences between alluvial solid Red soil. [2005]
9) Explain the formation of red soil. [2006]
10) Name two important crops associated with the following types of soil. [2007]
    i) Alluvial soil ii) Black soil iii) Desert soil iv) Laterite soil
11) Explain the formation of alluvial soil [2007]
12) What is laterite soil? [2007]
13) Why red soil is red in colour? [2008]
14) Why is laterite soil unsuitable for agriculture? [2008]
15) Explain the formation of soil. [2008]
16) Man is largely responsible for soil erosion. Give reason. [2008]
17) Write three characteristics each of 'Khadar' and 'Bangar' soil. [2008]
18) a) Name two states in India where Regur soil is found. In what way does Regur soil help agriculture?
    b) Mention two main characteristics of Laterite soil.
    c) State the difference between Alluvial soils found in the lower courses and the upper courses of rivers.
    d) Name two important agents of erosion. For each, state one method of controlling the erosion caused. [2011]
19) a) State two methods of controlling the erosion of soil caused by running water.
    b) Mention two differences in the alluvial soil of the northern plains and the alluvial soil on the coastal plains of India.
    c) Mention any three characteristics of black soil which makes the soil fertile.
    d) Give geographical reasons for the following:
        i) Laterite soil is not suitable for cultivation.
        ii) Red soil is red in colour.
        iii) Khadar soil are preferred to Bangar soils. [2012]
20) a) Differentiate between Transported soil and In Situ soil, quoting a suitable example for each.
    b) State two differences between Bhangar and Khadar.
    c) Name the process by which Laterite soil is formed. Mention one disadvantage of this soil.
    d) With reference to Red soils in India, answer the following questions:
        i) Name two states where it is found.
        ii) State two advantages of this type of soil.
        iii) Mention two important crops grown in this soil. [2013]
21) a) State any two methods of controlling soil erosion.
    b) Mention two differences between alluvial soil and red soil.
    c) Give a geographical reason for:
        i) different regions in India having different kinds of soil.
        ii) black soil being suitable for growth of cotton.
        iii) the conservation of soil as a natural resource.
    d) Name the soil which –
        i) is good for the cultivation of cashew nuts.
        ii) covers almost all of West Bengal.
        iii) is a result of leaching. [2014]