**AGRICULTURAL SCIENCE SS 1**

**SECOND TERM**

## SCHEME OF WORK

**WEEK TOPIC**

1. Revision of Last Term Work
   1. Cultural Practices: Pre-planting, Planting and Post-Planting Operations

4-5. Husbandry and Cultivation of Some Selected Crops

6. Agricultural Ecology

7. Rock Formation and Types

1. Rock Weathering and Process of Rock Weathering
2. Factors of Soil Formation
3. Revision.

11-12. Examination

**REFERENCES**

* Essential Agricultural Science by O. A. Iwena
* Fundamental Agricultural Science by P. E. Okafor
* Prescribed Agricultural Science by Omoruyi and Oruhue
* SSCE Agricultural Science Pack

**WEEK ONE**

**TOPIC: REVISION OF LAST TERM’S WORK**

**CONTENT**

* Answers to last term’s objective questions
* Answers to last term’s theory questions

**WEEK TWO AND THREE**

**TOPIC: CULTURAL PRACTICES**

**CONTENT**

* Pre-planting Operations
* Planting Operations
* Post-planting Operations

Cultural Practices in Agriculture

Cultural practices encompass a range of activities performed in farming, divided into pre-planting, planting, and post-planting operations. These practices are critical to ensuring the successful growth and establishment of crops. Let's delve into each category:

Pre-Planting Operations

1. Land Clearing:

- Land clearing involves the removal of existing vegetation from the farm. This can be done manually using cutlasses, hoes, and axes, or with the assistance of mechanical equipment like bulldozers and tree pullers.

2. Stumping:

- Stumping is the process of digging out tree stumps left on the soil surface after clearing. This can be done manually or mechanically using bulldozers.

3. Farm Layout:

- Farm layout is a strategic approach to dividing farmland into sections, optimizing land use, and maximizing yield.

4. Land Preparation:

- Land preparation involves activities such as tilling, creating beds, making heaps, forming ridges, and leveling the soil. Tilling, the breaking and turning of soil, can be carried out manually with hoes or mechanically with tractors and ploughs. This process ensures the soil is suitable for planting by breaking it into smaller clods.

Planting Operations

Planting operations involve the process of inserting planting materials (such as seeds or cuttings) into the soil. Key elements in this stage include germination and emergence.

- Germination: This is the process in which a seed begins to grow when provided with suitable conditions.

- Emergence: Refers to the moment when a seedling emerges above the soil surface.

Sowing Methods

1. In-Situ Sowing: Seeds are sown directly in the field, on flats, ridges, or garden beds. Crops like maize, okra, cowpea, and millet are typically sown in-situ.

2. Sowing Methods:

- Drilling: Seeds are sown by drilling holes in the soil, followed by the placement and covering of seeds.

- Broadcasting: Seeds are spread broadly across a prepared seedbed.

- Dibbling: Seeds are sown individually at specific points, with the correct depth ensured.

Basic Considerations in Planting Operations

1. Planting Space: The distance between planted seeds, both within rows (intra-row spacing) and between rows (inter-row spacing).

2. Planting Time: The timing of planting, often dependent on rainfall.

3. Planting Depth: The depth at which seeds are sown in the soil.

4. Number of Seeds: The quantity of seeds sown per planting point.

5. Seed Viability: The health and viability of the seed.

Nursery and Nursery Operations

A nursery is a dedicated space for raising seedlings before transplanting them into the field. Seedlings are typically grown in nursery beds, trays, boxes, or polythene bags. This practice is essential because:

1. Some seeds are tiny and challenging to handle.

2. Young seedlings may be too delicate for the field.

3. Protection from pests, sunlight, and rain is provided.

4. It allows for the selection of the healthiest seedlings.

Post-Planting Operations

Post-planting operations are the activities conducted after planting to create optimal conditions for plant growth. These operations include:

1. Thinning: The removal of excess, weak, or improperly positioned seedlings to avoid overcrowding and improve aeration.

2. Supplying: The replanting of propagative materials that failed to germinate, ensuring the correct plant population and uniform maturity.

3. Irrigation: Artificial watering during dry seasons to moderate soil temperature and supply nutrients to plants.

4. Manuring and Fertilizer Application: The addition of organic or inorganic substances to maintain soil fertility and provide essential nutrients.

5. Mulching: The covering of the soil surface with dry plant materials to conserve moisture, regulate soil temperature, reduce weeds, and add organic matter to the soil.

6. Weeding: The removal of unwanted plants (weeds) to prevent competition for nutrients, moisture, and space between crops.

7. Harvesting: The collection of mature and ripe parts of the crop for consumption.

8. Post-Harvest Operations: Processing, storage, and other activities to make farm produce more acceptable and prevent spoilage.

Storage: The safekeeping of processed farm products for future use, employing methods such as barns, cribs, silos, refrigerators, baskets, and sacks.

This comprehensive understanding of cultural practices in agriculture ensures the successful cultivation of crops and the effective management of farm produce from planting to post-harvest.

Evaluation

1. Thinning involves the removal of excess, weak, or improperly positioned seedlings from a seedbed after viable seeds have germinated.

2. Weeding tools include cutlasses and hoes.

3. Reasons for weeding are to prevent competition for nutrients, moisture, sunlight, space between crops, and to reduce the buildup of pests and pathogens.

4. Supplying is essential for maintaining the correct plant population and ensuring uniform maturity.

5. Manure is organic material added to the soil to enhance fertility. It can be in the form of green manure, farmyard manure, or compost.

6. Three ways of applying chemical fertilizers include broadcasting, localized placement, spraying, and foliar application.

General Evaluation/Revision Questions

1. What are cultural practices?

2. Differentiate between the categories of cultural practices: pre-planting, planting, and post-planting operations.

Field Work on Land Preparation

Practical demonstration of these practices can be carried out on the farm using simple farm tools, enhancing the understanding of these essential agricultural activities.

**WEEKEND ASSIGNMENT**

Primary tillage is otherwise known as \_\_\_\_A. harrowing B. ploughing C. ridging

D. stumping

Secondary tillage is otherwise known as \_\_\_\_ A. harrowing B.ploughing C.mulching D. stumping

* + - 1. The operation that follows harrowing is \_\_\_\_ A. ridging B. stumping C. clearing

D. layout

* + - 1. Stumping is carried out with the following except\_\_\_\_ A.gun B. cutlass C. bulldozer

D. axe

* + - 1. Which of these operations comes first? A. Tillage B. Ridges C. Stumping D. Harvesting
      2. Which of these operations involve the removal of left over parts of plants in the soil?

A. tillage B. Stumping C. Harrowing D. Ridging

* + - 1. Which farm operation involves the breaking or turning of the soil? A. Stumping

B. Ridging C. Tillage D. Harrowing

* + - 1. Which of these farm operations involves the division of plots for farm work? A.Ridging B. Harrowing C. Tillage D. Farm layout
      2. \_\_\_\_ allows easy penetration of roots into the soil A. Harrowing B. Tillage C. Stumping D. Land clearing
      3. One of the following is not a basic consideration in planting operation A. plating space B. planting depth C. planting time D. seed pod
      4. The distance between two sown seeds/plants is \_\_\_A. Planting space B. Time

C. Planting depth D. Planting seed

* + - 1. Some seeds are raised in the nursery because A. The seedlings are weak B. The seedling are green C. The seedlings lovethe nursery D. So that they can get enough sunshine
      2. This is the distance of the sown seed in the soil A. Planting time B. Planting Depth

C. Spacing D. Number of seeds

* + - 1. The covering of soil surface with vegetative material is known as A. Weeding

B. Thinning C. Mulching D. Supplying

* + - 1. This is the removal of unwanted plants on the farm A. Weeding B. Thinning C. Mulching D. Supplying
      2. This is the removal of excess and weak seedling from the seed bed A. Weeding

B. Thinning C. Supplying D. Mulching

* + - 1. Correct planting population can be maintained by \_\_\_\_ A. Thinning B. Supplying

C. Weeding D. Mulching

* + - 1. Which of these is not an organic manure? A. Compost B. Farmyard manure C. Green manure D. Ammonium nitrate
      2. The growing of crops (legumes) and ploughing of the same into the soil as soon as it flowers is called? A.Compost B. Farmyard manuringC.Green manuringD. Yellow manuring
      3. Which of these manure is faeces or dropping of animals usually used in making.

A.Compost B. Farm yard manure C. Green manure D. In organic manure

**THEORY**

1. What are cultural practices?
2. Write short note on the following: A. Land clearing B. tillage
3. Write short note on the following: A. planting distanceB. planting depth,C. seed viability.

**WEEK FOUR AND FIVE**

**TOPIC: HUSBANDRY AND CULTIVATION OF SOME SELECTED CROPS**

**CONTENT**

* Cultivation of Cereals
* Cultivation of Legumes
* Cultivation of Roots and Tubers

**CULTIVATION OF CEREALS**

|  |  |  |
| --- | --- | --- |
|  | **MAIZE (Zeamays)** | **RICE (Oryzasativa)** |
| Description | Maize also called corn is a member of the grass family (Gramineae). It produces grains, use as food by human beings and livestock. The seed/fruit is called caryopsis. | Rice is a member of the grass family (Gramineae). The seed/ fruit is called caryopsis |
| Varieties / cultivar | Sweet maize, flint maize, dent maize, flour maize and popcorn | Swamp rice (Toma) and upland rice (Agbede). |
| Land preparation | Clearing the land and making ridges either manually or mechanically. | Clearing the land and making ridges either manually or mechanically. |
| Climatic requirement | Temperature - 260C-300C, Rainfall – 75cm-150cm per annum | Temperature of 200c, Rainfall of 75cm-120cm for upland rice and over 250cm for swamp rice. |
| Soil requirement | Sandy-loamy soil of PH 6-7 | Loamy-clayey soil. |
| Method of propagation | By seeds | By seeds |
| Planting date | Early maize - March/April Late maize – July/August | South – April/May, North – August/ September. |
| Planting | It can be done manually using cutlass or mechanically by planter at 2-3 seeds per hole. | Planting can be done by broadcasting, sowing or drilling. |
| Seed rate | 20-30kg per hectare of land | 65kg per hectare at 2-3 seeds per hole. |
| Spacing | 80cm between row and 30cmwithin row | 25-30cm apart depending on varieties. |
| Cultural practices | Supplying, thinning, weeding fertilizer application, control of pests and diseases. | Supplying, thinning, weeding fertilizer application, control of pests and diseases. |
| Maturity period | 90-120 days after planting depending on varieties. | 4-7 months depending on varieties. |
| Harvesting | Harvesting can be done manually with hand or using a hand sickle and mechanically using a combined harvester. | Red heads of rice are harvested with knife, sickle or combined harvester. |
| Processing | It can be eaten either boiled or roasted or processed into corn flour or corn flakes. | Sun drying, threshing, winnowing, per boiling, hulling and polishing. |
| Uses | It is consumed by man and farm animals and as a raw material in brewery industries | It is consumed by man and farm animals. |
| Storage | Dried cobs are stored in cribs, rhombus or in a fire place, grains stored in a silo. | Processed form in silos or jute bags. |

**EVALUATION**

* 1. Mention the nutritional value of the following class of crops A. cereals B. legumes

C. vegetables D. spices E. beverage crops

* 1. Discuss the cultivation of a named cereal under the following subheadings A. soil and climatic requirement B. cultural practices C. planting date, materials and planting

D. maturity period (e) harvesting

**CULTIVATION OF LEGUMES**

|  |  |  |
| --- | --- | --- |
|  | **COWPEA (Vignaunguiculata)** | **GROUNDNUT (Arachishypogea)** |
| Description | Cowpea is a member of the pulses or legumes. It belongs to the family leguminoseae. It is rich in protein. The fruit of cowpea is called Pod. | Groundnut is a dual purpose crop. It serves as oil crop as well as a pulse or leguminous crop. However, it is grown mainly for its oil. The seed gives about 40-45% of excellent edible oil. |
| Varieties / cultivar | Erect type, creeping type, Ife brown, Ife bimpe | Bunch or erect type, creeping type, Kano local, Kano 50, castle cary. |
| Land preparation | Clearing the land and making ridges either manually or mechanically. | Clearing the land and making ridges either manually or mechanically. |
| Climatic requirement | Temperature of 27o-35oC, Rainfall of 60-125cm per annum. | Temperature of 25o-30oC, Rainfall of 70-100cm per annum. |
| Soil requirement | Well drained sandy loamy soil | Coarse textured sandy loamy soil which is slightly acidic and rich in calcium and phosphorus for pod formation. |
| Method of propagation | By seeds | By seeds |
| Planting date | April to September depending on the ecological zone. | South – March / April North – May / June |
| Planting | Planting can be done manually or mechanically at 2-3 seeds per hole. | Planting can be done manually or mechanically at 2-3 seeds per hole. |
| Seed rate | 20 – 25kg per hectare. | 30 – 35kg per hectare. |
| Spacing | Erect type – 30 x 75cm, Creeping type – 25 x 90cm | Erect type – 60 x 15cm Creeping type – 60 x 20cm |
| Cultural practices | Supplying, thinning, weeding fertilizer application, control of pests and diseases. | Supplying, thinning, weeding and control of pests and diseases. Groundnut does not need fertilizer application except on a very poor soil. |
| Maturity period | 9 – 12 weeks after planting depending on varieties. | 3 – 4 months after planting. |
| Harvesting | Hand picking of matured brown pods. | It is ready for harvest when the leaves turn yellow and begin to wilt. It is done by uprooting the plant manually or mechanically and allowing to dry for easy removal of pods. |
| Processing | Sun drying, threshing and winnowing. | Sun drying, removal of seeds from the pods by slightly pounding in mortar or using a decorticating or shelling machine. |
| Uses | A source of plant protein for man  It serves as a cover crop  It serves as forage legumes  It is used for making green manure. | For making oil  For making cake to feed man and farm animals  For making groundnut butter. |
| Storage | Seeds are stored in jute bags silos or air tight container after proper drying. Seeds should be treated with insecticide and the store fumigated to prevent weevils attack. | Dried groundnut seeds are stored in silos or rhombus. Unshelled pods are stored in jute bags. |

**EVALUATION**

1. Mention the pre-planting operations in cowpea cultivation
2. Mention three uses each of a) groundnut b) cowpea
3. Outline five importance of legumes

**CULTIVATION OF ROOTS AND TUBERS**

|  |  |  |
| --- | --- | --- |
|  | **YAM (Dioscoreaspp)** | **CASSAVA (Manihotspp)** |
| Description | Yam belongs to the family Dioscoreacea. It is a root and tuber crop grown in West Africa and it is rich in carbohydrates. | Cassava is a root and tuber crop, rich in carbohydrate. It is easily cultivated and can grow in relatively poor soil. |
| Varieties / cultivar | Water yam (Dioscoreaalata)  Yellow yam (Dioscoreacayenesis)  White yam (Dioscorearotundata)  Bitter yam (Dioscoreadomentorum  Aerial yam (Dioscoreabulbifera) | Sweet cassava (Manihotutilissima)  Bitter cassava (Manihotpalmata) |
| Land preparation | Clearing the land and making ridges either manually or mechanically. | Clearing the land and making ridges either manually or mechanically. |
| Climatic requirement | Temperature of 25o – 30oC, Rainfall of 100cm – 180cm per annum. | Temperature of 21o – 35oC, Rainfall of 150 – 200cm per annum. |
| Soil requirement | A well-drained sandy-loamy soil, rich in humus. | Dried loamy soil. It can also tolerate poor soil. |
| Method of propagation | By yam seeds or yam sets. | By stem cuttings (25 – 30cm long). |
| Planting date | Early yam – November / December Late yam – March / April | March to September depending on ecological zone. |
| Planting | Open a hole on the ridge using a hoe and place one yam sett inside with the cut surface turned upward and slantly placed at an angle of 45o | 2/3 0f the stem cuttings are buried in slanting position or at an angle of 45o. |
| Seed rate | 3 – 5 tonnes per hectare |  |
| Spacing | 90cm x 100cm | 100cm x 100cm. |
| Cultural practices | Mulching, weeding, application of fertilizers, staking, training of vine. | Weeding and fertilizer application. |
| Maturity period | 8 – 12 months depending on variety. | 10 – 15 months depending on varieties. |
| Harvesting | This is done by digging the soil gently with a cutlass to remove the tuber from the soil. | This is done by digging the soil gently around the tubers and pulling the stem gently so that the tubers are pulled along or use cassava puller. |
| Processing | It can be processed into yam flour. | It can be processed into cassava flour, garri or foofoo. |
| Uses | It is consumed by man and farm animals. | It is consumed by man and farm animals. |
| Storage | Yam tubers are store in barns. | Cassava is stored in processed form in sacs. |

**EVALUATION**

* 1. List three cultivars of yam and their botanical names.
  2. Name the soil and climatic requirement, planting material, maturity period and planting date in cassava cultivation

**GENERAL EVALUATION**

1. Discuss the cultivation of yam under the following subheadings A. method of propagation B. planting date and planting C. harvesting D. soil and climatic requirement
2. Discuss the production of a named legume under A. varieties B. soil and climatic requirement C. method of propagation D. planting (e) harvesting
3. State four uses of groundnut.
4. Discuss the cultural practices in yam cultivation.

**WEEKEND ASSIGNMENT**

1. Legumes that produce edible seeds are called A. pulses B. spices C. grains D. cereals
2. The following are cultural practices of yam cultivation except A. thinning B. staking

C. mulching D. weeding

1. The following are importance of mulching in yam cultivation except A. reduce soil temperature B. conserve soil moisture C. prevent pests attack D. prevent yam rot
2. Cowpea processing involves the following except A. threshing B. sun drying C. per boiling D. winnowing
3. Rice processing include the following except A. threshing B. winnowing C. fermentation D. per boiling

**THEORY**

1. Discuss the following practices in yam cultivation A. staking B. mulching C. training of vine
2. Outline four importance of legumes.

**WEEK SIX DATE……………**

**TOPIC: AGRICULTURAL ECOLOGY**

**CONTENT**

* Meaning of Agricultural Ecology
* Components of Farm Ecosystem
* Interactions Among the Components of Agro-ecosysytem

**MEANING OF AGRICULTURAL ECOLOGY**

Agricultural Ecology is defined as the study of crop plants and farm animals in relation to their environment. Ecology is derived from a Greek word “**Oikos”** which means home or dwelling place. In order words, agricultural ecology can be defined as a field of study which deals with the relationship of living organisms with one another and with the environment in which they live.

Agricultural Ecology is dividedinto:

A. Autecology

B.Synecology.

**Autecology**is concerned with the study of an individual organism, or a single species of organism and its environment. For example the study of a single cattle and its environment.

**Synecology**is concerned with the study ofthe inter-relationshipsbetween groups of organisms or species of organisms living together in an area. For example the study of different fishes in a fish pond in relation to their aquatic environment.

**Ecosystem** refers to a community of crop plants and farm animals functioningtogether with their non-living environment. In other words, ecosystem consists of living factors(plants and animals) interacting with the non-living factors in a farm environment.

**EVALUATION**

1. What is Agricultural Ecology?
2. Write short notes on the two aspects of ecology.
3. Define ecosystem.

**COMPONENTS OF FARM ECOSYSTEM**

The farm ecosystem is madeup of two maincomponents. These are:

* + 1. Biotic (living) components
    2. Abiotic (non-living) components

**BIOTIC COMPONENTS:** The biotic components include the living things i.e. crop plants and farm animals. The biotic components can be grouped into two classes which are; Autotrophism and Heterotrophism.

**(i) Autotrophism**: This is a group of organisms which makes use of sunlight or chemicals to manufacture their foodfrom inorganic substance during the process of photosynthesis. In other words, autotrophs are organisms mainly crop plants which are capable of synthesizing their own food, hence they are called producers.

**(ii) Heterotrophism**: This is a group of organisms mainly farm animals which cannot manufacture their own food but depend directly or indirectly on plants for their food, hence they are called consumers. Farm animals that feed directly on green plants (producers) are called herbivores or primary consumers e.g. cattle, sheep, goat and rabbit.

**ABIOTIC COMPONENTS:**The abiotic componentsof an ecosysteminclude the non-living things which are:

1. Climatic factors like rainfall, temperature, wind, humidity and sunlight.

(ii) Inorganic materials and nutrients such as carbondioxide, oxygen, nitrogen, calcium and phosphorus.

(iii) Edaphic factors like soils, rocks, topography.

(iv) Other factors like dust, storm, fire and water.

**EVALUATION**

1. Differentiate between autotrophs and heterotrophs.

2. State five examples of climatic factors.

3. Write short note on primary consumers with relevant examples.

**INTERACTION AMONG THE COMPONENTS OF AGRO-ECOSYSTEM IN SOME FARM SETTINGS**

1. **In Mono-cropping/Sole Cropping**: Mono-cropping is a system of cropping where one type of crop is grown on a farmland at a particular time. For example oil palm farm, kolanut farm, maize farm, etc. The interaction between the biotic and abiotic factors in the environment include:
2. Crop plants absorb nutrients from the soil to grow.
3. Crop plants also absorb water to grow and produce fruits.
4. Crop plants also take in carbondioxide from the air to carry out photosynthesis.
5. **In Mixed Cropping System:**Mixed cropping is a system of cropping which involves the growing of two or more crops on the same piece of land at the same time. Crops like maize, cassava, cowpea etc can be cultivated at the same time on the same farmland. Their interactions include:
6. Crops like cowpea is capable of adding nutrients to the soil.
7. Crops like cassava obtain nutrients from the soil to grow and produce fruits.
8. The leaves of all crops which fall on the ground,decayed and add nutrients to the soil through decomposition by soil microorganisms.
9. **In Mixed Farming:** Mixed farming involves the cultivation of crops and rearing of animals simultaneously on the same piece of farmland. The farm may be divided into two parts: one part for growing crops and the other for growing grasses and keeping of livestock. Their interaction include:
10. The grasses or the remains of crops serve as food for the animals.
11. The animal dungs and droppings are used as organic manure to improve the soil fertility for the crops.
12. Some crops like cowpea and crop residue may decay to release nutrients to the soil.

**GENERAL EVALUATION**

1. What is Agricultural Ecology?
2. Write short notes on the two aspects of ecology.
3. Define ecosystem.
4. State five examples of climatic factors
5. Explain briefly the interaction among the components of ecosystem in: A. mixed farming B. mixed cropping C. fish pond.

**WEEKEND ASSIGNMENT**

1. All these farm animals are polygastric animals except A. cattle B. goat C. rabbit

D. sheep

1. The branch of ecology which deals with the study of a single speciesof organism and its interaction with the environment is known as… A. autecology B. synecology

C. entomology D. pathology

1. Climatic factors include the following except… A. wind B. sunlight C. rocks D. rainfall
2. ….. involves the cultivation of crops and rearing of animals simultaneously on the same piece of farmland. A. Mixed cropping B. Mixed farming C. Bushfallowing D. Pastoral farming
3. The animal dungs and droppings are used as ………to improve the soil fertility for the crops. A. inorganic manure B. organic manure C. moisture D. mulch

**THEORY**

1. Write short notes on the two aspects of ecology
2. Explain briefly the interaction among the components of ecosystem in: A. a fish pond B.a forest/savannah

**WEEK SEVEN**

**TOPIC: ROCK FORMATION AND TYPES**

**CONTENT**

* Meaning of Rock
* Types of rock

**ROCK**

A rock is any mineral material of the earth. It may be a combination of different mineral elements such as silica (silica contain silicon and oxygen).

**TYPES OF ROCKS**

Rocks can be classified into three major groups based on how they are formed and their appearances. These include

1.     Igneous rock

2.     Sedimentary rock

3.     Metamorphic rock

**MODE OF FORMATION OF IGNEOUS ROCK**

They are formed as a result of cooling and solidification of molten magma erupted from the earth crust. Magma occurs from high temperature and pressure underneath the earth and forces itself towards the earth surface through the cracks. As the magma approaches the earth surface, it cools as a result of lower temperature of the earth surface and solidify to form igneous rocks.

**TYPES OF IGNEOUS ROCK**

1. **PLUTONIC [OR INTRUSIVE] IGNEOUS ROCK:**These are rocks formed when molten magma solidifies slowly before it gets to the surface of the earth to form large crystals. Prolonged erosion makes the rock to be exposed later to the surface. Examples include granite, gabbro, and diorite.
2. **VOLCANIC [EXTRUSIVE] IGNEOUS ROCK:** These are formed when the molten magma cools and solidifies rapidly when it gets to the surface to form crystals. Examples include basalt, pumice.

**CHARACTERISTICS OF IGNEOUS ROCKS**

1. They have glassy appearance
2. They contain crystals i.e they are crystalline in nature.
3. They do not occur in layers.
4. They do not contain fossils.
5. They are hard and impervious
6. They are resistant to erosion

**EVALUATION**

1. Describe the mode of formation of igneous rock
2. Outline four characteristics of igneous rocks

**MODE OF FORMATION OF SEDIMENTARY ROCKS**

They are rocks formed from deposits of organic materials and existing weathering rocks which accumulate and consolidate over time. They are cemented together after a long time to form sedimentary rocks. The sediments are deposited by natural agents such as water, wind and ice and settle down in layers one on top of another.

There are three types of sedimentary rocks based on the process of formation.

1. **Mechanically formed sedimentary rocks:**These are rocks formed from sediments of other rocks that are accumulated and cemented over a long period of time. Examples include sandstones, shale, clay, breccia, and conglomerate.
2. **Organically formed sedimentary rocks:** These are rocks formed from the remains of living organisms. When the rocks are formed from the remains of animals like coral or shellfish, they are called calcareous rocks e.g. lime stone and chalk. When the rocks are formed from vegetable matter such as swamps and forest are called carbonaceous rocks e.g. coal, peak, and lignite.
3. **Chemically formed sedimentary rocks:** These are rocks formed from precipitated chemically from rock solution. Examples include gypsum, potash, and dolomite.

**CHARACTERISTICS OF SEDIMENTARY ROCKS**

1. They occur in layers or strata.
2. They are not in crystal form i.e they are not crystalline in nature.
3. They contain fossils of plants and animals.
4. They are not resistant to erosion
5. They may be coarse, fine soft or hard.

**EVALUATION**

1. Describe the mode of formation of sedimentary rocks
2. State four characteristics of sedimentary rocks

**MODE OF FORMATION OF METAMORPHIC ROCKS**

These rocks result from igneous or sedimentary rocks due to combined effect of pressure and heat. The composition and texture of unstable parent rock minerals are changed under pressure and heat. Examples are marble, quartzite, gneiss, schist, graphite and slate.

* Slate is formed from clay (sedimentary)
* Marble is formed from limestone (sedimentary)
* Quartzite is formed from sandstone (sedimentary)
* Gneiss is formed from granite (igneous)
* Schist is formed from shale (sedimentary)
* Graphite is formed from coal (sedimentary)

**CHARACTERISTIC OF METAMORPHIC ROCKS**

* 1. Some may occur in layer or strata
  2. The rock may be hard or soft
  3. They are not in form of crystals
  4. They exist in different colours and texture
  5. They may contain fossils

**EVALUATION**

1. Describe the mode of formation of metamorphic rocks
2. Give four examples of metamorphic rocks and their parent materials

**GENERAL EVALUATION**

* 1. What is a rock?
  2. State three types of rock
  3. Describe the mode of formation of the two types of igneous rock
  4. State four characteristics of sedimentary rocks.
  5. Classify sedimentary rocks based on based on mode of formation and give two examples in each case

**WEEKEND ASSIGNMENT**

1. Which of the following is not a sedimentary rock? A. mica B. sandstone C. limestone

D. dolomite

1. Granite is --------- rock A. igneous B. sedimentary C. metamorphic D. weathered
2. Schist is formed from A. shale B. sandstone C. quartzite D. coal
3. A metamorphic limestone is A. marble B. gneiss C. schist D. shale
4. The type of rock formed from molten magma is known as A. sedimentary B. schist C. igneous D. sandstone

**THEORY**

1. Write short note on the mode of formation and characteristics of A. granite B. limestone
2. State three characteristics for each of the three rock types.

**WEEK EIGHT**

**TOPIC: ROCK WEATHERING**

**CONTENT**

* Meaning of rock weathering
* Types/Processes of rock weathering

**ROCK WEATHERING**

The process of soil formation is referred to as weathering.

Weathering is defined as the disintegration of rocks into smaller particles to form soil.

**PROCESSES OF ROCK WEATHERING**

The processes of soil formation (rock weathering) include:

1. Physical process
2. Chemical process
3. Biological process

**PHYSICAL PROCESS OF ROCK WEATHERING**

Agents of physical weathering include temperature, ice, rainfall, wind and pressure.

1. **Temperature:** The rise and fall of temperature brings about the expansion and contraction in rocks respectively. After a long time, rocks begin to crack and break down which later give rise to soil.
2. **Ice:** When rivers overflow their banks or when it rains, water collects in the openings. At a cool temperature or freezing point, the water in the openings freezes and increases in volume, the force of expansion makes the rock to expand thereby cracking them to particles. As the temperature rises, ice melts and carries the rock particles away from their origin to a different place to form soil.
3. **Rainfall /water:**The splash of rainfall exerts force on the rock surfaces. Flowing water also carries and hits rock particles against one another turning them into fragments.
4. **Wind:** heavy winds carry particles of rock, hitting them against one another or against hard surfaces to form smaller fragments.
5. **Pressure:** high pressure on hanging rock may cause such rocks to fall and the process break into smaller particles to form soil.

**EVALUATION**

1. Define rock weathering.
2. What are the processes of rock weathering?
3. List three agents of physical weathering.
4. Describe two of the agents of physical weathering.

**CHEMICAL PROCESS OF WEATHERING**

Agents of chemical weathering include solution, hydration, hydrolysis, carbonation and oxidation.

1. **Solution:**This is when water dissolves soluble minerals present in the rock and the minerals taken from one place to another while flowing.
2. **Carbonation:** Carbon (iv) oxide reacts with water to form trioxocarbonate (iv) acid, a weak acid which weakens and dissolves rock minerals.
3. **Hydration:**This is the reaction of water with rock minerals which result in chemical alteration of the mineral. Example is the conversion of iron (ii) rocks to hydrated rocks.
4. **Hydrolysis:** This is the reaction of water with rock minerals to produce a rock that is different from the original one.
5. **Oxidation**: This is the reaction of rocks with oxygen from the atmosphere which then weakens the rocks.

**EVALUATION**

1. List five agents of chemical weathering
2. Explain two of the processes mentioned above

**BIOLOGICAL PROCESS OF WEATHERING**

This is the activities of plants and animals in the breaking down of rocks to form soil.

1. The action can be brought about by some animals such as termites, earthworms, millipedes and other soil organisms.
2. Movement of some organisms /heavy animals like cattle can cause small fragments of rocks to disintegrate.
3. The roots of some crops penetrate through cracks in rocks making them to expand and break to form soil
4. Activities of man during tillage can break small rocks into tiny pieces.

**EVALUATION**

1. Outline four biotic factors of rock weathering
2. What are the processes of rock formation?
3. State three agents of physical weathering.

**GENERAL EVALUATION**

* 1. What is rock weathering?
  2. What are the processes of rock formation?
  3. State three agents of physical weathering
  4. Describe five agents of chemical weathering.
  5. List five factors of soil formation.

**WEEKEND ASSIGNMENT**

* 1. The attachment of water to rock minerals resulting in chemical alternation of the minerals is termed A.carbonation B. hydration C. hydrolysis D. solution
  2. The reaction of rock with oxygen from the atmosphere which eventually weakens the soil is A. carbonation B. oxidation C. hydrolysis D. solution
  3. Which of these is not an agent of physical weathering A. ice B. water C. animal

D. temperature

* 1. Which of the following is not a soil organism that disintegrates rock particlesA. termite B. earthworm C. cattle D. millipede
  2. \_\_\_\_ is defined as the disintegration of rocks into smaller particles to form soil.

A. Chemical reaction B. Weather C. Weathering D. Breaking down

**THEORY**

1. A. What is rock weathering?

B. Mention three processes of rock weathering.

1. List and discuss three agents of one of the processes mentioned above.

**WEEK NINE DATE: ……………………..**

**TOPIC: FACTORS OF SOIL FORMATION**

**CONTENT**

* Climate
* Parent materials
* Topography
* Biotic factors
* Time

**FACTORS OF SOIL FORMATION**

The factors that control soil formation include; climate, parent materials, topography, biotic factors (living organisms) and time.

**CLIMATE**

Climate refers to the average weather condition of a place measured over a long period of time. Elements of climate include sunlight, temperature, wind, relative humidity, rainfall and pressure.

**Rainfall:** Running water as a result of from rainfall causes gradual wearing away of rocks during erosion giving rise to soil. Impact of rain drops can also break rocks to form soil.

**Temperature:** The alternate heating and cooling of rocks give rise to continuous expansion and contraction of rocks. This causes cracks in rock and over time lead to formation of soil.

**Wind:** High wind velocity most especially in desert regions carries tiny rocks which hit themselves or other rocks leading to breakdown of rocks into tiny pieces to form soil.

**Pressure**: High pressure in a hanging rock may cause the rock to fall down and break into tiny pieces to form soil.

**EVALUATION**

1. What is climate?
2. List five elements of climate

**PARENT MATERIAL**

The physical and chemical features of parent materials determine the type of soil that can be obtained from such material. Parent of predominantly quartz mineral give rise to sandy soil while that of micas and feldspars give rise to clayey soil.

**TOPOGRAPHY**

Soil erosion is more pronounced on sloppy area than flat land. Wind or water easily wears away the soil and rock surfaces in sloppy area. As the rock particles are washed down to the bottom of the slope, the particles further break up into smaller particles due to combined effect of other processes of weathering.

**EVALUATION**

1. Describe how parent materials affects soil formation.
2. What is topography?

**BIOTIC FACTORS [LIVING ORGANISMS]**

The action of microorganisms, plants and animals plays active part in rock formation.

* Termite and earthworms mix the minerals and organic matter together resulting in the formation of soil.
* The burrowing activities of earthworm and crickets permit the air and water movement in the soil which reacts with rock to cause breakdown into soil.
* Activities of man during tillage operation break rock into tiny pieces to form soil.
* Penetration of plant roots cause weathering of rocks.
* The decaying of falling leaves of the trees with the aid of bacteria result in the formation of humus rich in plant food.

**EVALUATION**

1. List five biotic factors of soil formation
2. Describe briefly the role of vegetation in soil formation

**TIME**

Time also plays an important role in soil formation. It takes a long time for mature soil to be formed.It takes time for small pieces of rocks to disintegrate into grains of soil. It also takes a long time for plants to decay and become part of the soil.

**GENERAL EVALUATION**

1. What are the factors of soil formation?
2. What are the elements of climate
3. List five biotic factors that causes soil formation
4. List five biotic factors of soil formation
5. Describe briefly the role of vegetation in soil formation

**WEEKEND ASSIGNMENT**

1. The average weather condition of a place over a period of time is referred to as

A.Climate B.Vegetation C.Biotic factor D.Humidity

1. Which of these is not a climatic factor of soil formation? A.Temperature B.Wind

C.Humidity D.Erosion

1. The following are biotic factors influencing soil formation except A.Termites activitiesB. soil pHC.Microorganism D.Tillage activities
2. The shape of the ground in relation to the underlying rock of the earth surface is known as \_\_\_\_\_A.slopeB.disintegrationC.topographyD.weathering
3. Which of the following is not a factor of soil formation?A.Topography B.Vegetation C.Parent material D.Weathering

**THEORY**

1. Mention two major elements of climate
2. Discuss three ways by which vegetation affect soil formation.

**WEEK TEN**

**REVISION**