Biyani's Think Tank

Concept based notes

Physical Geography
B.A. I Year

Kalpana Depan
Deptt. Of Arts
Biyani Girls College, Jaipur

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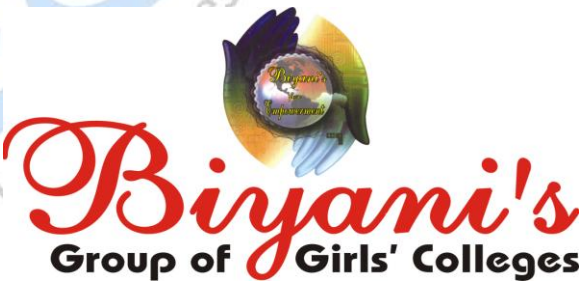

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Preface

I am glad to present this book, especially designed to serve the needs of the students. The book has been written keeping in mind the general weakness in understanding the fundamental concepts of the topics. The book is self-explanatory and adopts the "Teach Yourself" style. It is based on question-answer pattern. The language of book is quite easy and understandable based on scientific approach.

Any further improvement in the contents of the book by making corrections, omission and inclusion is keen to be achieved based on suggestions from the readers for which the author shall be obliged.

I acknowledge special thanks to Mr. Rajeev Biyani, *Chairman* & Dr. Sanjay Biyani, *Director* (*Acad.*) Biyani Group of Colleges, who are the backbones and main concept provider and also have been constant source of motivation throughout this Endeavour. They played an active role in coordinating the various stages of this endeavor and spearheaded the publishing work.

I look forward to receiving valuable suggestions from professors of various educational institutions, other faculty members and students for improvement of the quality of the book. The reader may feel free to send in their comments and suggestions to the under mentioned address.

Author

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Syllabus

Section-A

Nature and scope of Physical Geography. Main divisions of physical geography. Geological Time Scale, Solar System, Origin of the Earth introduction to various theories, Interior of the Earth. Origin of continents and oceans. Theory of Continental Drift (Wegener's Drift theory). Introduction of Plate Tectonics. Theory of Isostasy. Earth Movements and resultant structural forms. Volcanoes and Earthquakes. Rock Denudation: (i) Weathering- types and results, (ii) Erosion- concept of cycle of erosion, Agents of erosion- works of running water, glaciers, wind, waves and underground water. Erosion and conservation of land.

Section-B

Composition and structure of the atmosphere. Environmental pollution and Atmospheric Hazards- causes, types and effects. Insolation, Diurnal, monthly and annual average temperatures, Maximum and minimum temperatures: world patterns- July and January (Horizontal shifting and breaking of temperature belts), Vertical distribution of atmospheric temperature, Inversion of Temperature. Types of Rainfall, Forms of Condensation, World Distribution of Rainfall-July and January, Humidity- types and world pattern.

Air Pressure: Global pattern, seasonal shifting and breaking of pressure belts. Vertical distribution of air pressure.

Winds : Permanent, Periodical and Local winds, Air Masses, Cyclones, anti-cyclones and associated weathers.

Clouds: Formation and Types.

Classification of Climate by Koppen and Thornthwaite, Climatic Zones of the world and their salient characteristics. Climate and human Health.

Section-C

Definition, Scope and Nature of Oceanography. Importance of study of Oceanography, Hydrological Cycle-Normal and in arid, humid and cold climatic zones, Ocean floor (Hypothetical). Floor of the Indian Ocean. A detailed study.

Distribution of Temperature of Ocean water-Horizontal and Vertical.

Salinity: Open Oceans, Partially enclosed seas and Land locked seas. Causes of inequalities.

Movements of Ocean water: Waves, Tides and Currents. Marine deposit. Coral reefs.

Oceans as the store house for future (economic importance). Pollution of Ocean waters: Causes and Results.

Section A
Lithosphere

Que1: Describe the rock classification?

Ans : Rocks is the solid material that makes the earth's crust . The entire solid surface of the earth is made up of rocks of various types. Soils, sand and other loose materials are not usually considered to be rock, although they are derived principally from rocks.

Major types of rocks:

They are classified into three types according to origin:

1) Igneous rocks
2) Sedimentary rocks
3) Metamorphic rocks

(1) Igneous Rocks: are those that solidified from a melt (called magma, a molten mixture of rock –forming minerals and usually volatiles such as gases and steam). Since their constituent minerals are crystallized from molten material, igneous rocks are formed at high temperatures. Examples are: Granite, Basalts**.**

(2) **Sedimentary rocks**: are produced by the weathering of pre-existing rocks and the subsequent transportation and deposition of the weathering products. Examples are shells, rock gypsum, chalk, coal etc.

(3) **Metamorphic rocks**: are those formed by changes in pre-existing rocks under the influence of high temperature, pressure, and chemically active solution. The changes can be chemical and physical in character.

Examples are (a) Quartzite is the metamorphic rock form of the sedimentary rock sandstone. (b) Marble is the metamorphic from of limestone.

Que2 : **Explain the Interior structure of the earth surface** ?

Ans : sources for the study of earth's interior :-

1. Artificial sources –

(a) Density
(b) Pressure
(c) Temperature
(d) Meteorites

(a) Average density of earth: 5.52g/$cm^{3.}$ Average density of earth's crust: 2.6 to 3.3g/cm^3. This indicates higher density below the crust and because the acceleration due to gravity is quite uniform everywhere therefore mass is distributed in the form of concentric layers.

(b) Pressure in itself is not responsible for the increase in density; rather the core is composed of intrinsically heavy metallic materials of high density.

(c) Temperature increases at the rate of 2degree to 3 degree C on every 100m.

(d) Meteorites allow us to determine the density, mineralogy and chemistry of the nickel iron core of bodies having a similar composition to that of the earth.

(e) Theories related to the origin of earth- Planetesimal, tidal and nebular hypothesis.

(3)Natural sources
(a) Vulacanicity
(b) Evidences from seismology.

Seismology- study of seismic wave is of three types:-

(1) Primary compression waves- To and fro motion of particles in line of the propagation of the ray. These rays can pass through both the solid and the liquid medium.
(2) Secondary waves- Particles move at right angles to the rays. These waves cannot pass through the liquid.
(3) Surface waves- Affect only the surface of the earth and cover the longest distance of all seismic waves. It has lower speed than P and S waves but is of most violent and destructive nature. These waves get reflected and refracted while passing through a body having heterogeneous composition and varying density zones at the discontinuities.

Many such discontinuities are expressed as follows:-
(1) Guttenberg discontinuity- Between outer liquid core and the solid mantle.
(2) Mohorovicic discontinuity- Between crust and mantle.
(3) Conrad discontinuity- Between oceanic and continental.
(4) Crust- Up to 30-40 km beneath the continents.
- 10 km deep beneath the oceans.

MANTLE- Below the crust and up to 2900km. It is a solid layer.

CORE- Outer core is liquid in state where as inner core is solid.
Chemically the earth can be divided into following layers:
(1) **SIAL**- Just below outer sedimentary cover.
- Composed mainly of granites
- Density -2.9
- 50 to 300 km thick
- It forms the continental layer

- Silicates mainly present are those of sodium, potassium and aluminum.

(2)**SIMA**-

- Below SIAL
- Composed mainly of basalt
- Source of magna and lava
- Rich in silica and magnesium
- Density – 2.9 to 4.7
- Thickness – 1000 to 2000 km
- Basic in nature
- Silicate mainly present are those of magnesium, calcium and iron

(2) NIFE-

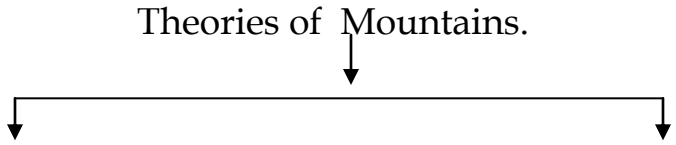
- Below SIMA
- Rich in nickel and iron
- Very high density
- Diameter of this layer -6880 km
- Indicates magnetic property of the earth's interior

Que3: Define the mountain building process. Explain the Geosynclines theory of mountain building in detail?

Ans : Mountain is the significant relief feature of 2nd order on the Earth Surface. It covers the whole part of 1/3 or 27% of the Earth Surface in its length, height & weight & new folded mountains are suited are one of these.

According to **Salisbury,**

"Mountains are consequently high land which has narrow but slight arrow summit areas. Mountains building processes was a problem to explain this phenomena may views & theories were presented. These theories may be divided into 2 ways-



Based on contraction of the Earth convectional current (Theory of Kober, Suess & Jeffery)

Based on the (Theory of Homes)

I. Geosynclines Orogen theory of Kober

Importance & objective of the Theory:

Kober was a German geologist & he presented a varied & systematic description of Earth features in his famous book '**Der Bender Erode'**. The main objective behind presenting this theory is that is that he wanted to establish a relationship between geosynclines (long, narrow, shallow water area) which he called '**Orogen'** & rigid masses which he called **'kratogen'**. Such kratogen includes the Canadian Shield, the Baltic shield, the Siberian shield, Peninsular Indic, Chinese massif & the Brazilian & the African Shield.

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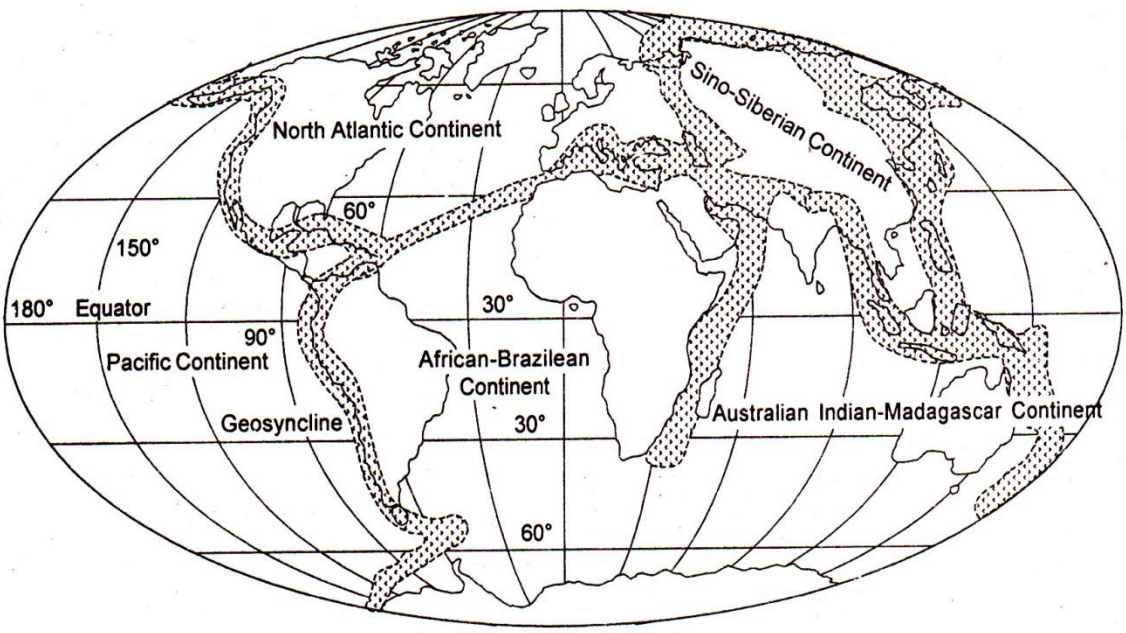
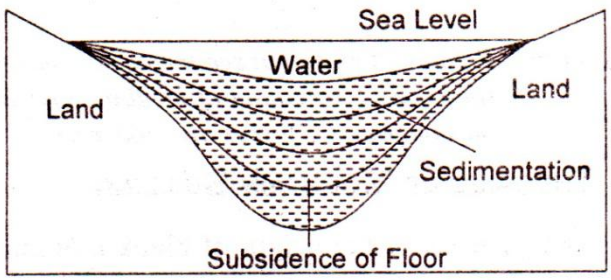


Distribution of rigid masses and geosynclines during Mesozoic era as depicted by E. Haug.

Kober opined that the whole process of mountain building passes through 3 stages.

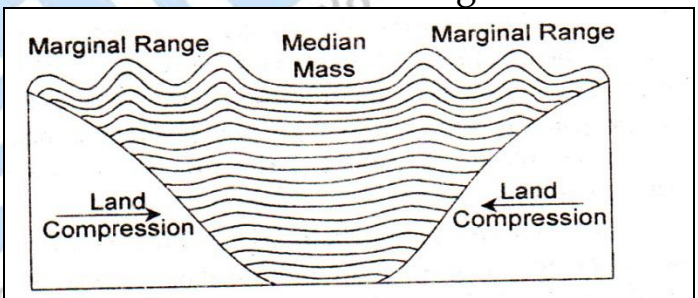
1. **Lithogenesis**- This is the stage of creation of geosynclines, sedimentation and subsidence. That is formed due to contraction caused by cooling of earth. The geosynclines are narrow & wide mobile zone of water which is bordered by rigid cases the kober named as forelands or kratogen.



The stage of lithogenesis: creation of geosyncline followed by sedimentation and subsidence.

The forelands or kratogens which border geosynclinals succumbed to the forces of denudation.

2. **Orogenesis**- In this stage the geosynclinals sediments are squeezed & folded into mountain ranges.

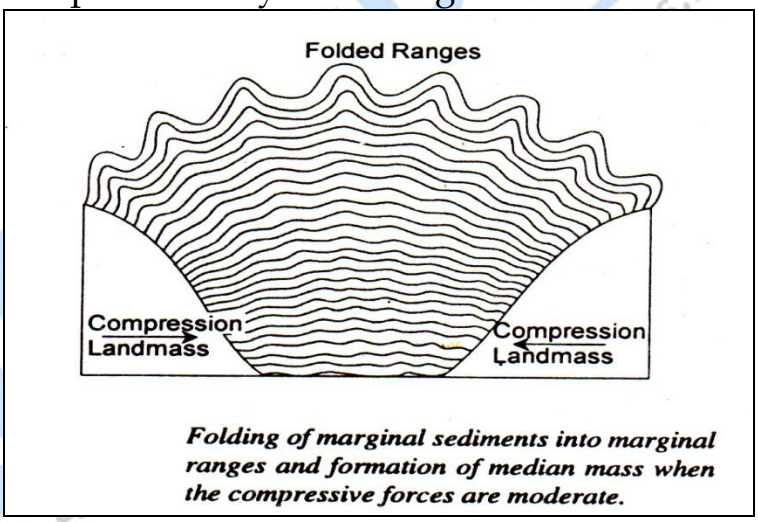


The stage of orogenesis: squeezing and folding of geosynclinal sediments due to compressive forces; the whole of geosyndinal sediments are folded when the compressive forces coming from the sides of geosyncline is enormous and acute.

Both the forelands start to none forwards each other because of horizontal movements caused by force of contraction. The parallel ranges formed on either side of the geosynclines have been termed by kober as randketten.

Example Alps- proper, Carpathians, Balkan mountain & Caucasus Mountain were formed due to northward mountains of African foreland.

3. **Gliptogenesis**- This phase of mountain building is characterized by a gradual ascent of mountain ranges and the ongoing denudation processes by natural agents.



Folding of marginal sediments into marginal ranges and formation of median mass when the compressive forces are moderate.

Criticism-

1. The force of contraction produced by the cooling of the earth is not adequate for the formation of massive mountain like Himalayas, Alps.
2. Suess argued that the only one side of geosynclinals moves while the other side remains static. Suess termed the moving side as 'backland' & the stable side as 'foreland'. He opined

that the Himalayas were formed by the southward movement of Angara land & Gondwanaland did not move.

3. Geosynclines are found along the continental margins'.
4. Geosynclines may exist in front of river mouth.

Que4 : Explain the Thermal Convection Current Theory of Mountain building in detail ?

Arthur Holmes postulated his thermal convection current theory in 1928-29 to origin of major relief features of earth's surface.

Orogenetic Force:
The driving force of Mountain building in by Arthur Holmes is thermal convection current originating deep within the earth. The main source of the origin of convective currents is excessive heat in the substratum where in disintegration of radioactive elements generates heat regularly.

Base of the theory: Holmes on the bases of interval structure of earth into 2 bases.

1. Crust (2) Substratum
The origin of convective currents within the earth depends on the presence of radioactive elements in the rocks. According to him, these are maximum Concentration of radioactive elements in the curst but temperature is not so high because there is gradual loss of heat through conduction & radiation. On the other land, through there is very low concentration of radioactive elements in the substratum but the gradual accumulation of heat produced by radioactive elements causes connective current.

<u>Mechanism of the Theory</u>:

It may be pointed out that the currents originality under the equatorial crust moves towards. There are two situations

i) The crustal mass, where 2 rising convective current diverge in opposite direction is stretched & thinned due to the tensional forces & ultimately the crust broken into 2 blocks. This divergent connective currents cause continental drift.

ii) Where 2 lateral convective currents originating under the continental & Oceanic Crusts converge compressive force is generated which causes subsidence giving birth to geosynclinals & closing the sea. Those convective currents move the crustal rocks away in opposite directions & thus create seas & Ocean while convergent convective currents bring crustal blocks together & thus Form Mountain.

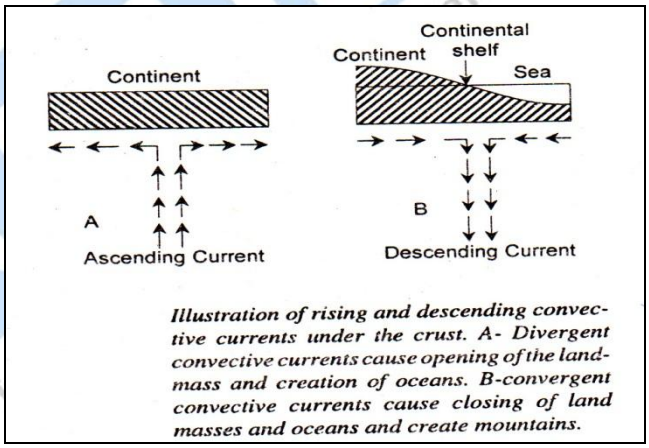


Illustration of rising and descending convective currents under the crust. A- Divergent convective currents cause opening of the landmass and creation of oceans. B-convergent convective currents cause closing of land masses and oceans and create mountains.

Homes define 3 stages for Mountain building formation.

1. **Stage-I**

In it the convergent current are originated in substratum & thus geosynclines forms and that geosynclines are subjected to continuous sedimentation & subsidence.

2. **Stage-II**
   That increase in the velocity of convective currents. The main cause increase in the velocity of convective currents is the downward movement of cold materials in the falling column & upward movement (rise) of hot materials in the rise of column of convective currents. This buckles geosynclinals sediments & thus initiates process of mountain building.

3. **Stage-III**
   This stage is known as stage of Gliptogenesis. In it the velocity is become low & gradually, the rising column becomes a cold column & convective current is become end.

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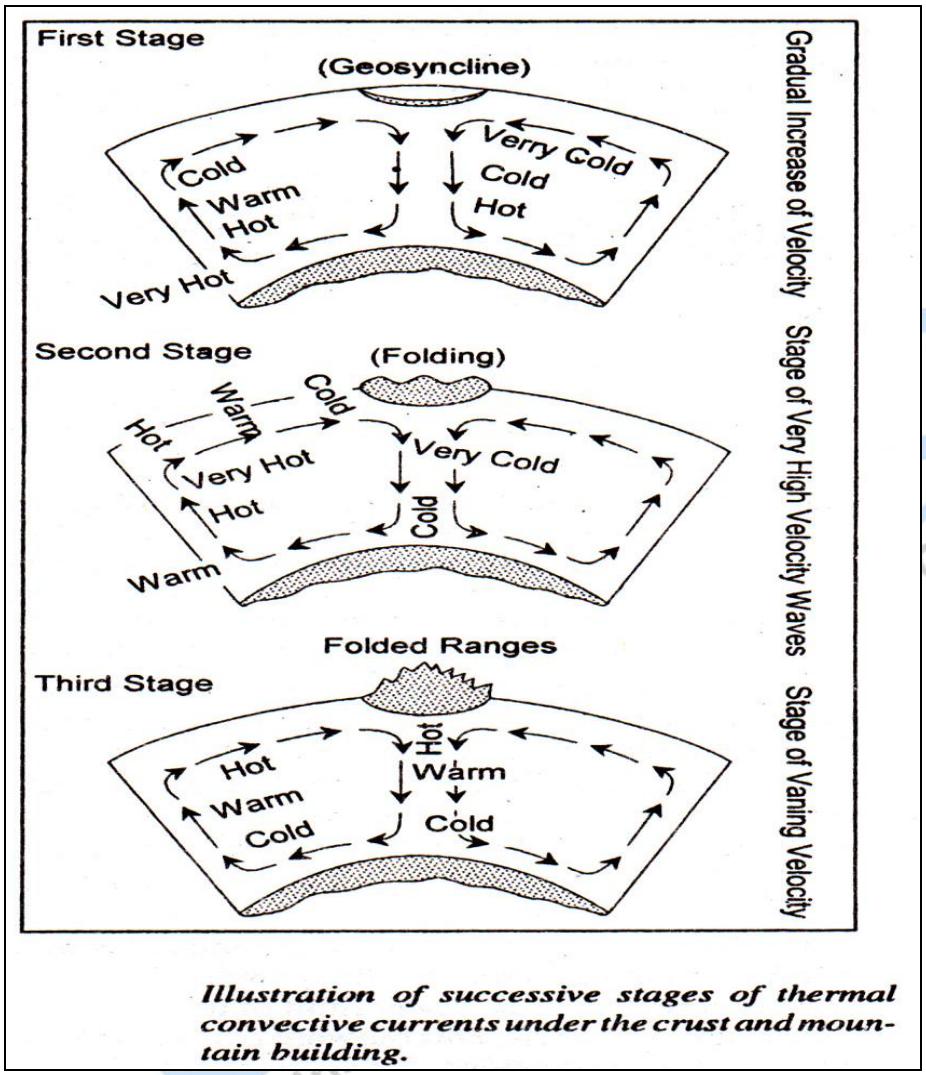


Illustration of successive stages of thermal convective currents under the crust and mountain building.

Criticism:-

1. Rising & falling column are doubtful phenomenon.

2. The whole mechanism of convective currents depends on the heat generated by radioactive elements in the substratum but doubt about the availability of required amount of heat generated by radioactive elements.
3. The horizontal flow of thermal convective currents under the continental & Oceanic Crusts is also a doubtful phenomenon because of lack of required amount of heat to drive these currents.

Que5 : Define Weathering and also define its different forms ?

Ans : The process of disintegration and decomposition of rocks in situ is generally called **weathering.**
It means weathering is a static process.
Factors controlling of weathering-

1. **Composition & structure of Rocks**- The joints in rocks permit water to enter the rock and achieve chemical and physical weathering.
2. **Nature of Ground Slope-** It controls mechanical disintegration of rocks and mass movement of weathered products down the slope.
3. **Climatic Variations-** Climates determines whether policy or chemical weathering will predominate and the speed with which these processes will operate.
4. **Floral Effects**- It also determined by the presence or absence of vegetation in a particular region.

5. **Topography**- It directly affects weathering by exposing rocks and in directly through the coconut precipitation, temperature & vegetation.

Types of weathering

There are 2 main types of weathering.

1. Physical or Mechanical weathering.
2. Chemical weathering.
3. Biological or Organic weathering

1. **Physical or Mechanical weathering**- The physical or mechanical weathering leads to fragmentation & breakdown of rock masses into big blocks and boulders, cobbles & pebbles, sand. This may be caused by 6 agencies, which are as follows-
   i. **Frost action**- Water expends when being transformed into the solid state, called frost or ice. This expansion exerts enormous pressure so that when water freezes within the cracks of the rock, great strains are caused & fragments may be broken off, or the rocks are shattered to a considerable depth. Shattered rocks are frequently met with in the higher elevations of the Himalayas.

   ii. **Daily temperature changes**- Weathering due to diurnal temperature changes are essentially a consequence of direct heating of rocks.

   iii. **Exfoliation**- The breaking or peeling off of concentric plates from bare rock surfaces is called '**exfoliation**'. Plutonic rocks like granites normally get exfoliated. The result is peeling off of scales from their surface &

appearing as exfoliation dames as in the Khasi hills, kyllang, Meghalaya.

iv. **Relative hardness of rocks**- Some rocks like sand stone are hard, & some like shale's are soft. Weathering of soft rocks under a copping of hard rock's gene rise to 'pedestal rocks'. Such land feature found in Satpura Hills, Himachal Pradesh.

v. **Action of Plants & animals**- The roots of trees on the hill ides penetrate into cracks of rocks & widen then. This facilitates the percolation of water & air the total effect of which is the breakdown of rocks.

vi. **Gravity-** It is an indirect cause of mechanical weathering. We see huge boulders standing in the edge of a cliff about to fall down & when they actually tumble down the slope, they may break off portions of hill slopes.

2. **Chemical weathering**- Decomposition and disintegration of rocks due to chemical reaction is called Chemical Weathering results in:-

   i. An increase in volume which produces stresses within the rocks.
   ii. Lower density materials
   iii. Particles of smaller size which produce a larger surface for chemical interactions.

3. **Biological or Organic weathering**- Plants assist in surface weathering by both chemical & mechanical means. Algae,

mosses, lichens & other vegetation retain water on the surface of the rock & various organic acids help to decay the rock beneath so that a tuft of moss may lie in a small & growing hollow in the rock. The mechanical disintegration effect of vegetation is mainly due to the penetrating & expanding power of roots which exert considerable force as they grow & help to wide cracks & crevices this allowing water & air to enter.

Que 6 : **What is Erosion? Explain its different forms?**

Ans: Erosion is the earth sculpting processes by which the rock debris produced by weathering is transported. Agents that move rock fragments include gravity, running water, moving ice, wind waves, tides & currents.

1. **Corrosion**- The wearing a way of rock or soil by chemical & solvent action, i.e.–by carbonation, Hydration, Hydrolysis, Oxidation & solution. This is mostly occurring by the water.
2. **Abrasion**- The process of wearing down of a land surface by money weathering rock debris or by the river flow.
3. **Attrition**- This is also done by River, glacier, wind & sea waves. When the large boulders or rock erode the river floor or the sand particles present in winds erode this process is called attrition.
4. **Plucking**- One of the main erosion processes carried out by a glacier, effecting the removal of rocks from its valley floor water enters cracks in the rocks of the floor freezes & detaches rock fragments, which becomes frozen to & carried away by the under surface of the glacier as it moves along.
5. **Deflation**- The removal of five rock debris by wind, especially likely to occur in Arid or semi-arid.

6. **Hydraulic Action**- The processes in which minerals combine with water &
   Expend there by exerting pressure within the rock pores (exfoliation). They like affected in chemical weathering.

Que7: What are the Differences between Weathering & Erosion?

Ans: In **weathering** there is only the disintegration or decomposition of rock through different factors but in it transport is not involved whereas in **erosion** this transportation work is included. Means the processes of wearing a way of land surface by natural agents (water, ice, waves, and winds) & the transport of rock debris that results in called erosion.

Que8 : Explain the concept of Cycle of Erosion by W.M.Davis?

The hypothetical sequence of changes or stages through which an uplifted land surface would pass in its reduction to base level by the action of natural agencies in the processes of Erosion this cyclic processes is called **cycle of Erosion.**

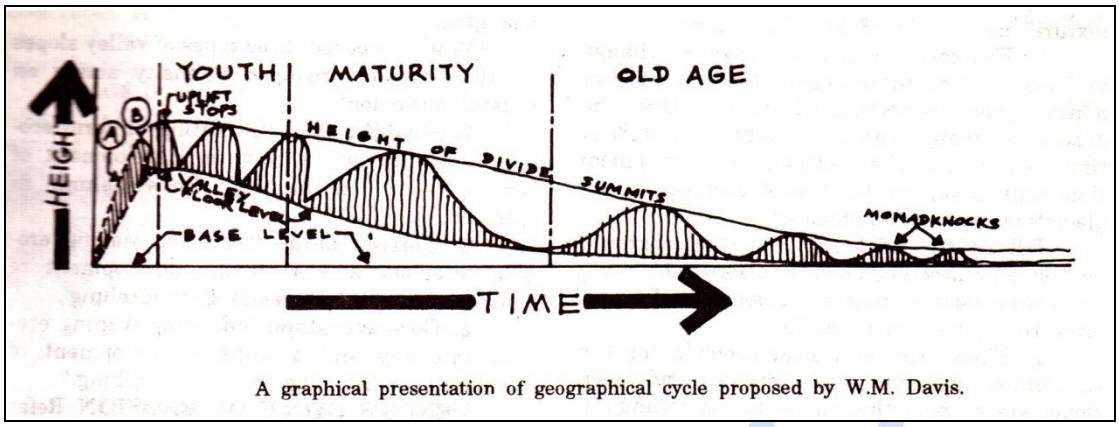
W.M. Davis- William Morris Davis, American geomorphologies, was first present a general theory of land for development. In 1899 he presented his theory. Davis assumed that any land part or structure cannot developed suddenly whereas its development is a long process which passes through from several stages in a form of cycle & at last this converted into a plain.

According to Davis 3 factor play important role in the origin & development of land forms of a particular place. These 3 factors are called '**Trio of Davis'**. & his concept is expressed as follow- "landscape is a function of structure, process & time."

1. **Structure**- means lithological (rock types) & structural characteristics (folding, faulting, joints etc.) of rocks.
2. **Process**- means the agents of denudating including both weathering & Erosion.
3. **Time**- In it different stages (Youth, Mature & Old stage) are included.

The whole cycle passes from 3 stages-

1. **Youthful Stage**- Erosion starts after the completion of the upliftment of the landmass. (The top surface is not affected by Erosion because the rivers are small & widely spaced.) This stage is characterized by rapid rate of vertical erosion & valley deepening & in absolute height remains constants.
2. **Mature Stage**- In it the vertical erosion or valley deepening is remarkably reduced, there marked lowering of absolute relief. Thus absolute relief & relative relief both decreases.
3. **Old Stage**- In it almost total absence of valley incision but lateral erosion & valley widening is still active process. The valleys become almost flat with concave valley side slopes & convert into monad hocks & at end the complete landforms converted into penne plane valley.



A graphical presentation of geographical cycle proposed by W.M. Davis.

Positive Aspect of Davis Model:

1. This model was highly simple & applicable.
2. This model explains the whole processes form the formation of land form in a simple way. This is mode to known blow any land form is made.
3. Davis based his model on detailed & careful filed observations.
4. The change is base land is thoughtful & it show the correct form of erosion.

Criticism: -

1. His concept of upliftment is not acceptable. He has described rapid rate of upliftment of short duration but as evidenced by plate tectonics upliftment is long continued process.
2. Davis concept of relationship between upliftment & Erosion is erroneous.
3. An ideal Davision cycle would take millions of years of complete. What about the earth movements during the cycle?

4. It is unlikely that a cycle can be complete because interferences such as climate changes or other elements bound to upset the orderly progress of cycle.

Que 9. Describe the land forms associate with Karst topography?

Ans. Karst is special region of well jointed carboniferous limestone in which carbonation is the dominant weathering process. In this region the underground water will aquifers or seepage maximum amount due to this they abrade the found & make new forms of structure or features. These are mainly found in Yugoslavia

Necessary conditions for the development of karst topography.

1. Karst topography generally develops in those areas where thick beds of massive limestone's lie just below the layer of surficial material.
2. They also develops en collimate, times tunes & chalk.
3. Limestone should be massive, thickly, bedded, hard, well jointed & should not be porous & not by the mass of rocks.
4. There should be enough rainfall so that required coconut of water is available to dissolute carbonate rocks.
5. The limestone should be highly folded or fractured or faulted.

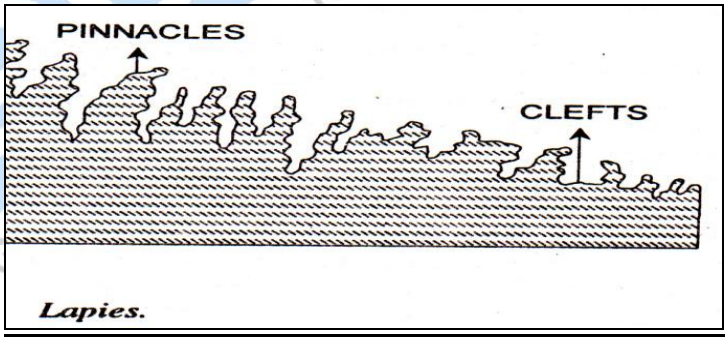
There are 2 types of force work here.

1. Erosion landforms
2. Depositional landforms

1. **Erosional landforms**-

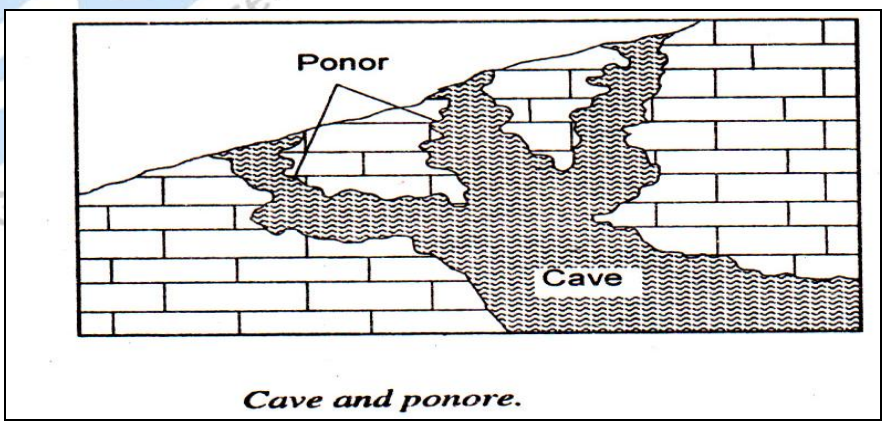
Erosion land forms developed because of solution & Carbonation.
Karst land forms develop best under certain favorable circumstances – Presence of soluble bedded & jointed rocks like limestone & moderate rainfall.

1. **Lapies**- The highly corrugated & rough surface of limestone, characteristics by low ridges & pinnacles & narrow clefs & numerous solution holes are called Lapies. In different place it is known as clints or graykes in N. England, Karren in Germany, bogaz in Yugoslavia & Siberia. Chemically active rain water dissolves limestone & other Carbonate rocks along their joints & numerous types of solution holes are developed. They are small in size & wide are called sink hides.



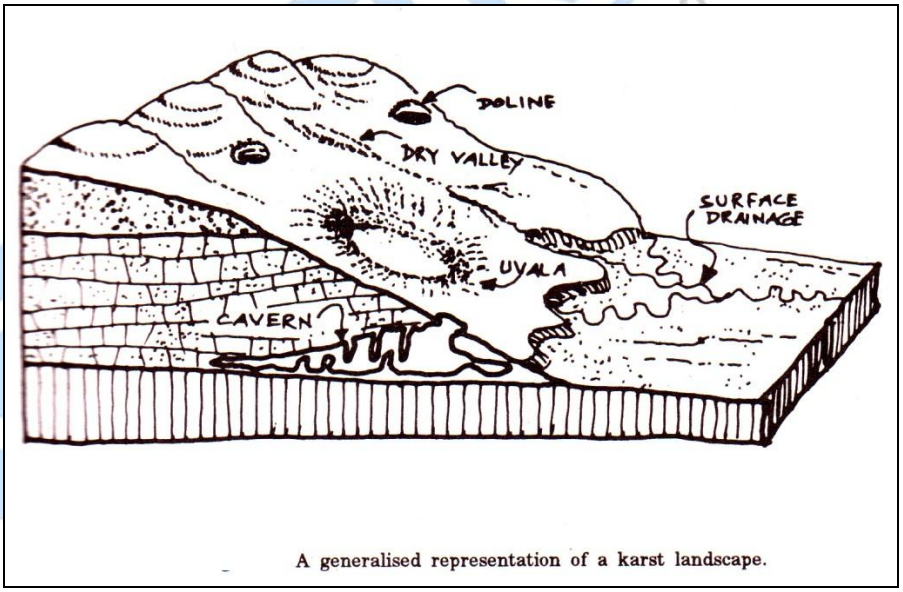
Lapies.

2. **Solution Holes & associated features**- Due to continuous dissolution of limestone's results in the closely spaced sink hole into one large hole which is called "Swallow hole".
3. **Doline**- Some sink holes are further enlarged due to continuous solution into larger depressions which are called dolines.
4. **Uvalas**- A number of adjoining dolines may come together to form a large depression called uvalas. They are also called the compound sink holes.
5. **Polje**- When many uvalas combined or most extensive, larger then dolines depressions are called 'poljes'. They are vertical side walls, flat alluvial floors, irregular borders & central lake.
6. **Karst window**- is formed due to collapse of upper surface of sink holes or dolines. These windows enable the investigators to observe sub surface drainage & other features formed below the ground surface.
7. **Ponors**- The vertical pipe like passages that connect the comets & the Swallow holes are called 'ponores'.



Cave and ponore.

8. **Caverns-** These are underground comes formed by water action by various method in limestone area. For example found in India near Dehradun and S. Bihar.
9. **Blind valley**- In the limestone region when the surface streams which flow out from the hole over the surface than that valley disappear. That valley is called Blind valley.
10. **Natural Bridge**- Due to Collapse of the roof of cause than they make the form of natural Bridge.
11. **Karst Valley**- During rainy season small surface streams formed this U-shaped valleys developed on lime stones are called Karst valley or solution valley.



A generalised representation of a karst landscape.

Depositional land forms-

Depositional landforms take place aided by chemical reaction, temperature, and pressure, loss of because and evaporation of water.

Causes of deposition:

1. Chemical reactions
2. Loss of carbon di oxide
3. Change in temperature and pressure
4. Evaporation

Depositional landforms

1. **Speleothems:** deposits in the caves are collectively, called "Speleothems:"calcite is the common constituent.

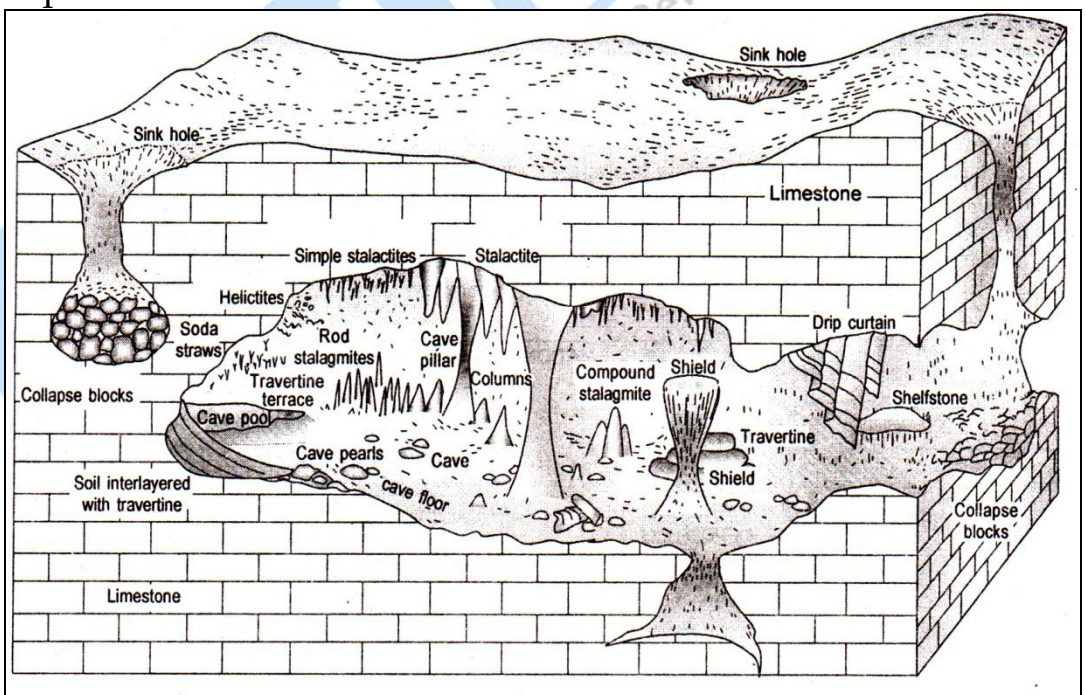
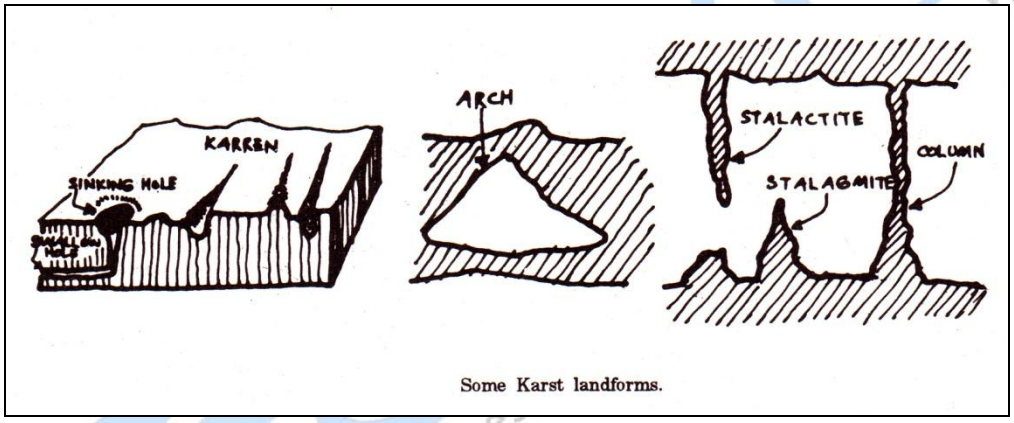


Fig. 19.9 : Formation of stalactites, stalagmites and cave pillars (various forms of speleothems).

2. **Drip stones:** calcareous deposits formed by dripping of water in dry caves.
3. **Stalagmites:** A column of calcium carbonate which grows upwards from the floors of a cave.
4. **Stalactite**: formed due to deposits of calcium carbonates from ceiling.
5. **Cave pillars**: are formed when stalagmite and stalactites meet together.



Some Karst landforms.

Que10: Define the landforms formed by Marine or Coastal?

Ans :Marine land form are produced by the joint action of oceanic waves, currents & tides on the coastline of all these factors, waves are the most important of all in carving our landforms.

Mechanism

1. **Corrosive action**- Boulders, pebbles & sands are hurled against the coast by breaking waves & this causes under cutting & rock break up.
2. **Hydraulic action**- When water is thrown against the shore, by braking waves, the air expends suddenly often explosively. This causes rocks to shatter & crake become enlarged & extended.
3. **Attrition action**- The particles are themselves worm down by friction and impact, and become finer and finer.
4. **Corrosion & solution**- is simply a solvent action.

Erosional landforms:-

1. **Cliff**- Steep rocky coast rising almost vertically above sea water is called sea cliff.

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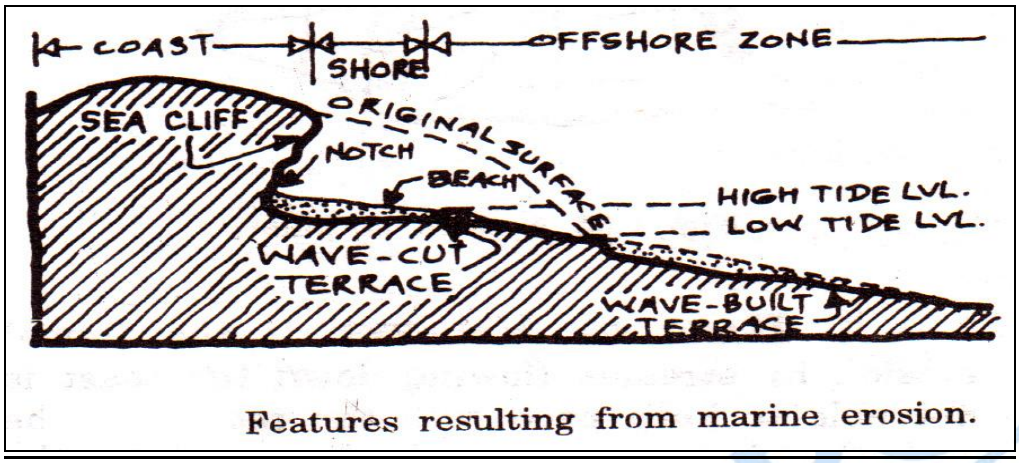


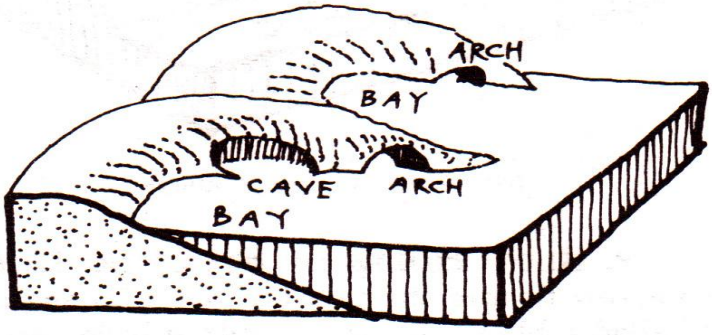
Features resulting from marine erosion.

2. **Notch**- The point of wave attack at the base of cliff is sometimes preserved in resistant strata as a wave-cut notch.

3. **Wave-cut Platform**- is formed due to cliff recession. A wave cut platform is produced at its base.

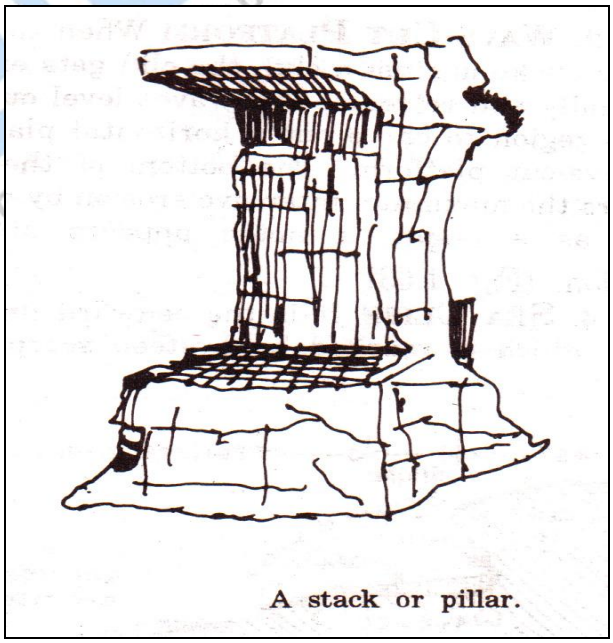
4. **Sea caves**- Where hard & soft rocks lie alternately softer rocks are worm back into inlets coves or bays & harder one persists are head.

5. **Sea Arch**- (The headland is subjected to erosion from 2 sides. Thus, cause is excavated in both the sides of the headland) or When two caves developing on either sides of headland join to gather, they give rise to natural arch or sea arch.



Erosion-based landforms—bay, cave and arch.

6. **Stack**- The arch collapses & an isolated pinnacle, called stack, is left in front of the cliff.



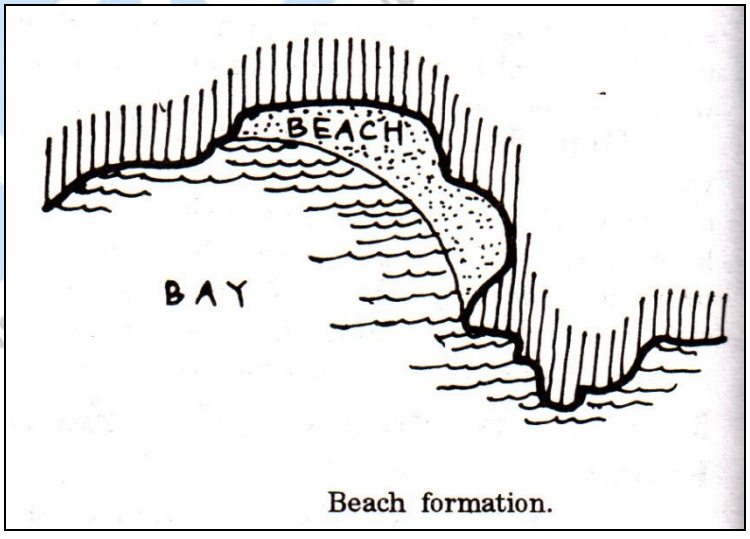
A stack or pillar.

7. **Stump**- These rock pinnacles crumble & collapse & end up as were stumps slightly above sea level.

8. **Blow Hide**- Sometimes, the air in the cave is compressed by up rushing powerful storm waves & finding no other route to escape it breaks open the roof of the cave & appears with great force making unique whistling such holes are called 'natural chimneys' or 'blow holes'.

Depositional Landforms -

1. **Beaches**- A beach is a land on shore between the high water mark and low water mark. It is built of unconsolidated sediment like cobbles, boulders, five silt & clay.



Beach formation.

2. **Carp Beach**- is small regular embayment and a series of headlands composed of shingles.

3. **Spits**- If the sand bars are formed in such a way that there one end is attached to the land while the other end projects or opens out towards the sea, they are called spits.
4. **Bars**- The ridges, embankments or mounds of sands formed by sedimentation through sea waves parallel to the shorelines are called bars.

5. **Off-Shores bars**- If the bars are formed in such a way that they are parallel to the coast but are not attached to the land they are called off-shores bars.

6. **Compound hook**- It is a curved spit. The hook once formed is modified by many cross currents & the spits go lengthening by successive additions, as compound hook.

7. **Loop**-The spits are bent to sauce on extent that they are attached to the mainland (coast) & thus form complete loop, which enclose sea water in the form of lagoon. Such forms of a spilt is called **loop**.
8. **Tombola**- A bar connecting mainland with an island or connecting a headland with the island called tombola.

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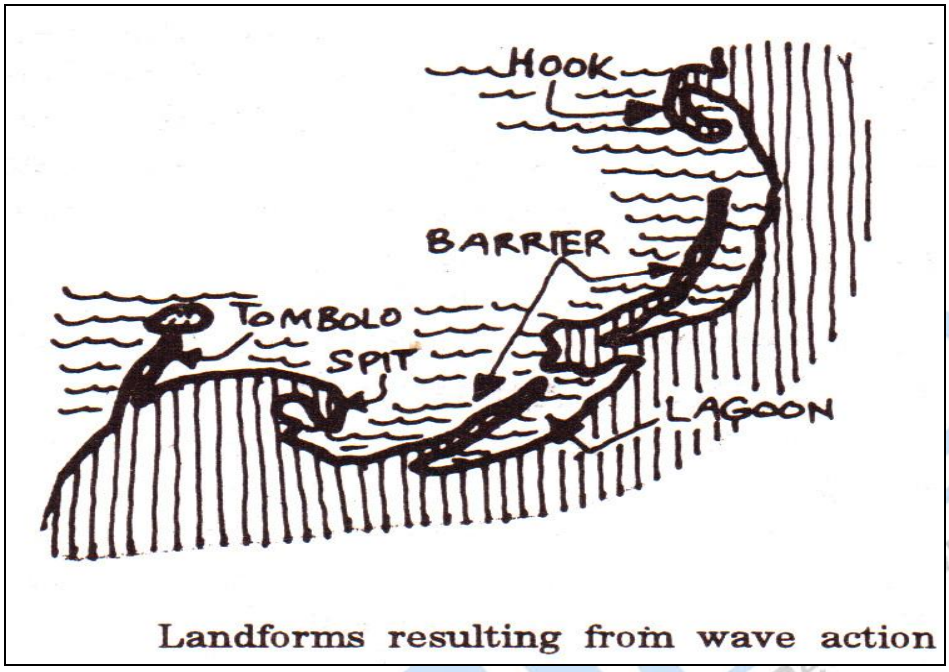


Landforms resulting from wave action

Que11: Define the Glacier topography?

Ans: The moving ice mass down slope under the impact of gravity is called glacier. About 10% of the earth's surface is move covered by glaciers.

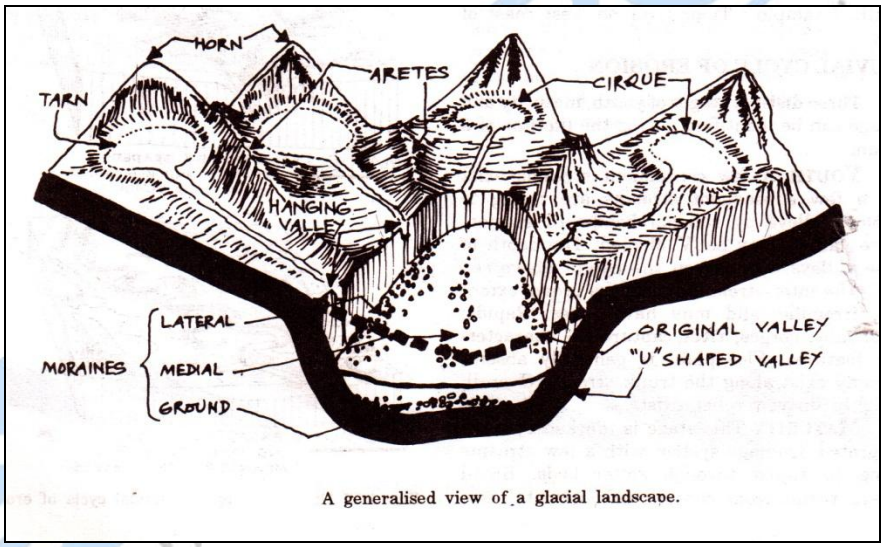
Glaciers are formal due to accumulation of ice above snow-line, under extreme cold climate

A glacier during its life time creates various land forms which may be classified into erosional & deposional land forms.

I. **<u>Erosional Landforms</u>**-

A glacier is supposed to erode the rocks, transport the eroded materials & deposit the eroded materials at suitable places like other agents of erosion & depositions.

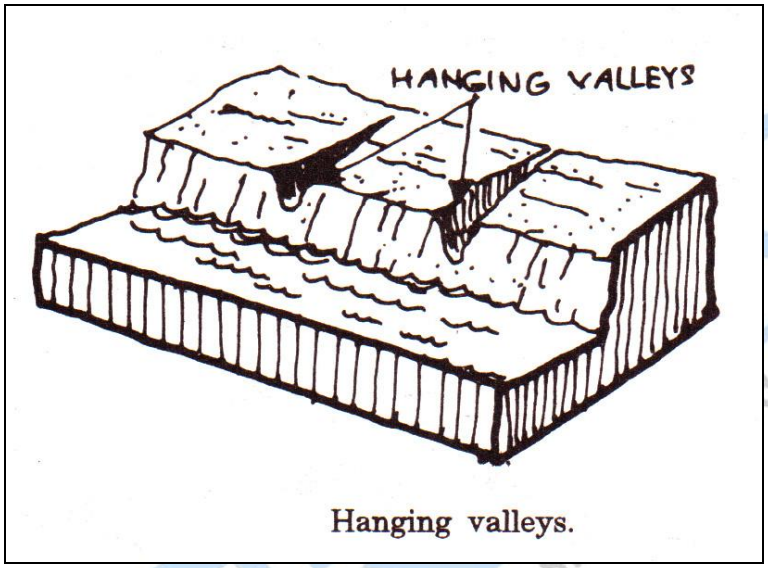
1. **Cirque**- The armchair-shaped or horse shoe-shaped, step, walled depressing represents a glaciated valley head.



A generalised view of a glacial landscape.

2. **U-shaped valley**- is another typically glacial feature. Since glacial mass is heavy & show moving erosional activity is uniform horizontal as wee as vertical. Steep sides & flat bottomed valley of 'U' shaped.

3. **Hanging Valley**- valleys of tributary glaciers which join the main glacial valleys of much greater depth are called hanging valleys.

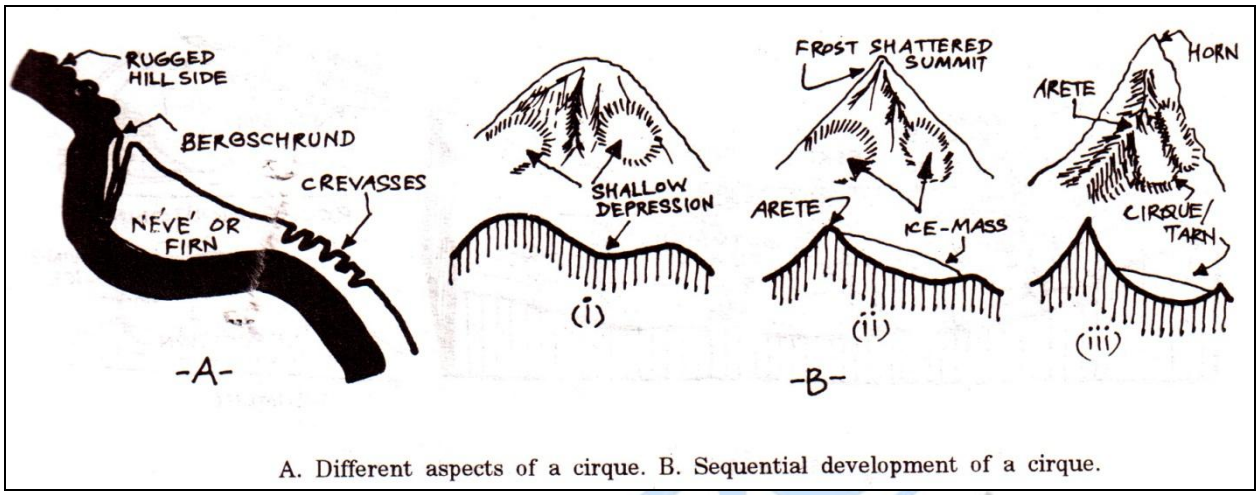


Hanging valleys.

4. **Horn-** A pyramidal or triangular faceted peak formed due to recession & intersection of three or more cirques is called horn.

5. **Tarn**- A rock basin is formed as a cirques basin due erosion consequent upon greater thickness of ice mass & its enormous pressure. After that it filled with water and make a small lake is called Tarn Lake.

6. **Arêtes**- is a steep sided, sharp-tipped summit with the glacial activity Arête cutting into it from two sides.



A. Different aspects of a cirque. B. Sequential development of a cirque.

7. **Col**- The crest line of arêtes & pyramidal places is called 'Col & Peak' topography .Example Mount Kailash in Tibet.

8. **Nunatak**- The higher peak & mounds surrounded by ice from all sides are called nunataks. They look like scattered small islands amid extensive ice masses.

9. **Crag & Tails**- A peculiar land forms having vertical eroded steep side up glacial side & tail like stricture with lower weight called crag or tail.

10. **Sheep rocks or Roches Moutonees-** are a streamlined asymmetrical hillocks or hills having one side smoothly mounded with gentle slope & steeped & craggy lee side.

11. **Glacial Stairways**: - are very picturesque glaciated landforms. The length of each stair ranges from few meters to several kilometers. The advancing ice of fanciers covers out giant stairway through the process of abrasion & plucking in form of stairs.

12. **Fiords**- are formed as a steep sided narrow entrance like feature at the coast where the stream meets the coast.

II Depositional land forms-

They are formed due to setting down of glacial drift.

1. **Moraines**: - Moraines are ridge like depositional features of glacial tills. It may be in association with active ice or deposited by former & ice sheets.
   It may be transported on the surface of the ice, within the ice or beneath the ice are in 4 categories:
   a) Terminal, b) Lateral moraines, c) Medial moraines, d) Ground moraine

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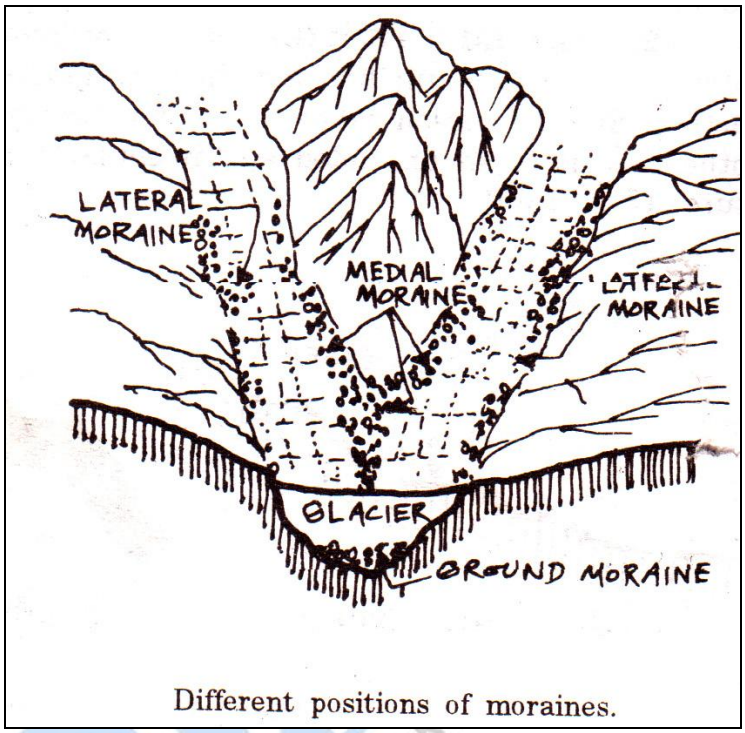

Different positions of moraines.

2. **Drumlin**- The swarms of rounded hummocks resulting from the deposition of glacial till are called draw lines. They look like an inverted boat or spoon.

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Section B
CLIMATOLOGY

Climatology is concerned with the seasonal characteristic of weather patterns experienced over various parts of the earth and with the processes that contribute to these features.

Que 12: **Define the structure of Atmosphere with diagram?**
Ans. **STRUCTURE OF ATMOSPHERE**

The atmosphere is a significant component of the biosphere eco-system because the life on the earth's surface is for this atmosphere otherwise the earth would have become barren like moon. The height of the atmosphere up to 800 Km is most important. The atmosphere consists of several zones and layers. They are as follows:

1. **Troposphere**:

The lower most layer of the atmosphere is known as the troposphere and is the most important layer because almost all of the weather phenomena (fog, due, cloud, frost, rainfall, lightning etc.) occur in this layer .Temperature decreases with increasing height of the rate of 6.5^0C per 1Km/1000 m. This rate of decrease of temperature is called normal lapse rate. There is seasonal variation in the height of troposphere; its height is decreases during winter from equator toward the poles and it became increased during summer. The average height of troposphere is about 16 Km. over the equator and 6 Km over the poles. The upper limit of troposphere is called tropopause which is about 1.5 Km. thick and height is 18Km over the equator and 9 to10 Km over the poles. There is also a seasonal variation in its height. The word troposphere means 'zone or

region of mixing whereas the word tropopause' means 'where the mixing stops'.

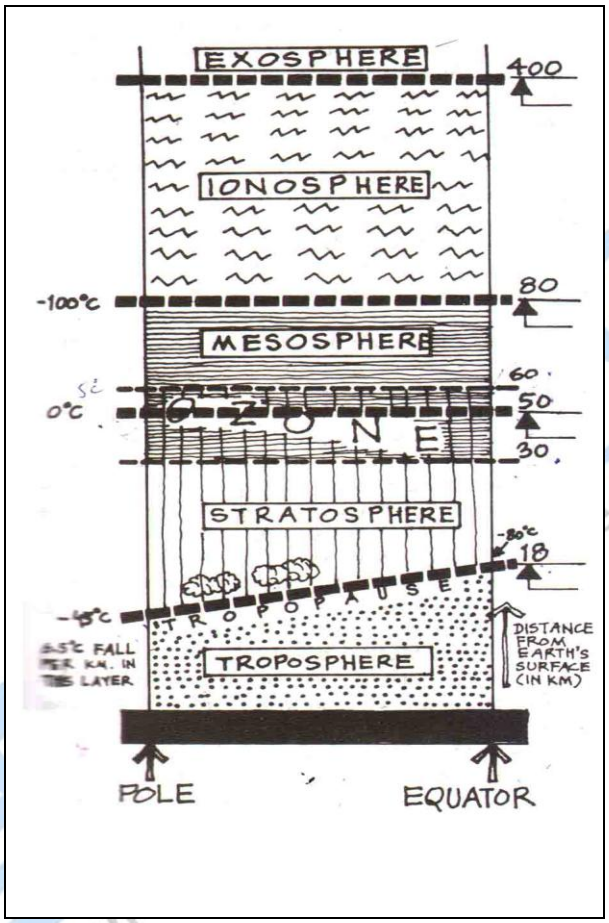
2. **Stratosphere**:
   The layer just about the troposphere is called stratosphere. The height of this zone is up to troposphere to about 50Km. Here no change in temperature. The upper limit of the stratosphere which is known as stratosphere, so here major weather phenomena like winds, cirrus cloud etc.

3. **Ozonosphere**:
   It is extended between the 30^0to60^0 Km suited between the middle of Stratosphere & Mesosphere. This layer contains most of atmospheric ozone Atmosphere it absorbs almost of the ultra violet rays of solar radiation & thus protects the Earth surface from becoming too hot. In this layer temperature increase at the rate of 5^0C for 1Km.

4. **Mesosphere**:
   It extended between 50 to 80 Km Temperature again decreases with increases height Pressure is very low in this layer.

5. **Thermosphere** :
   It is suited on the mid of 80 to 400 Km. is an electrically conducing layer from which radio signals can be reflected Temperature rise with height, owing to the absorption of ultraviolet radiation by atomic oxygen.

6. **Exosphere & Magnetosphere**:
   This is the upper most layer of Atmosphere extended between 400-800 Km .The densities become extremely low and temperature is increases.



Que 13: Define Air Pressure and explain the air pressure belts ?

Ans: Air pressure is the weight of column of air at any given place & time (1sq inch, 1sq foot, 1sq cm, 1sq m etc.). The atmospheric pressure is maximum at sea-level. The atmospheric pressure is maximum at sea level. It exerts the weight of 14.7 pounds on the area of 1 sq. inch at sea level. The distribution of atmospheric pressure is shown on a map by isobars.

Horizontal distribution of Air pressure & Pressure Belt:

The distribution of atmospheric pressure are across the latitude is termed as global Horizontal distribution of air pressure on the globe is studied by isobars lines. On our earth there are 7 main pressure belts are as follows:

1. Equatorial low pressure belt doldrums:-

It is extended between the either sides of equator in zones of 10^0 S to 10^0N latitudes but this zone is not stationary because there is seasonal shift of this belt with the north ward & southward its width 5^0N 5^0S to 20^0N 20°S . Thus warmed air expands, becomes light, can sequent rises upward causing low pressure. The equator low pressure belt represents the zone of convergence of North and South trade winds. Because of frequent calm conditions this belt is called '**belt of calm'** or '**doldrums'**.

2. Sub-tropical high pressure belt or Horse latitudes:-

Sub-tropical high pressure belt extends between the latitude of 25^0-35^0 in both the hemispheres. This is why this zone is characterized by anticyclone conditions which cause atmospheric stability and aridity. This is one of the reasons for presence of hot desert of world in the western parts of continents.

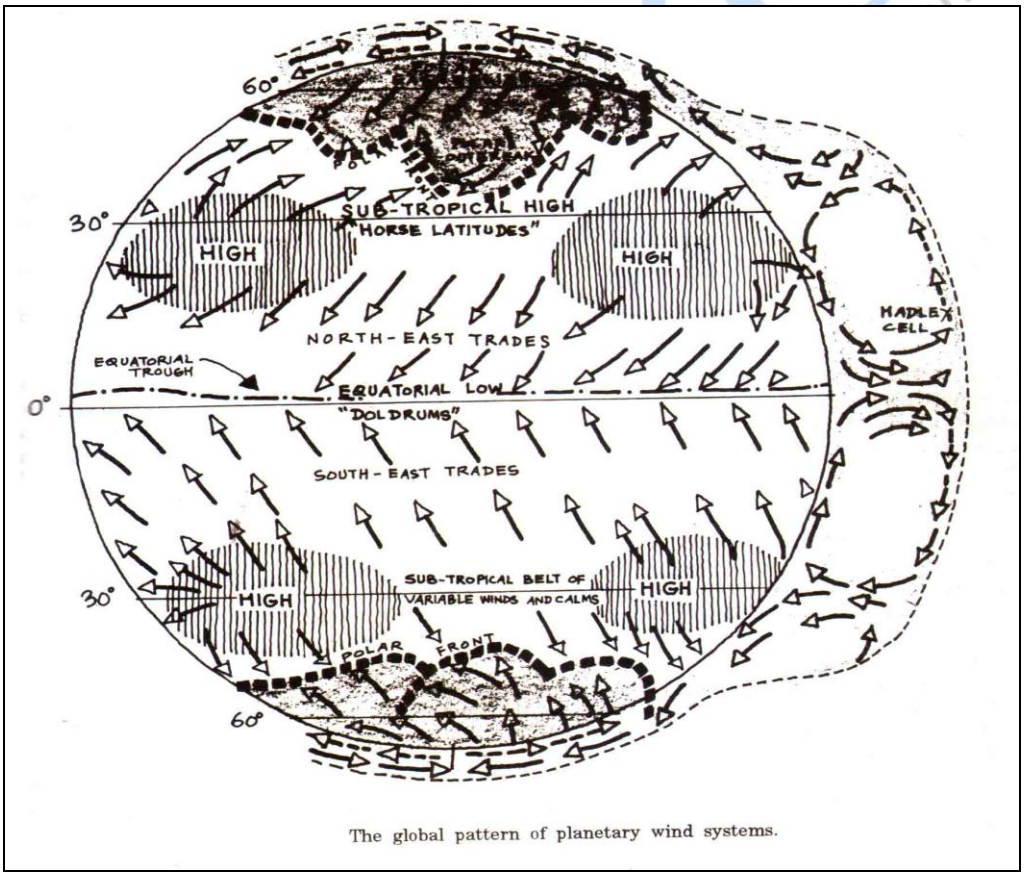
3. Sub-Polar low pressure Belt:-

This is located between 40^0 to 65^0 latitude mid of Antarctica & Artic circles. The surface air spreads outward from this zone due to rotation of the earth & low pressure is caused. This factor should be more effective at the poles but the effect of the rotation is rerated & prevailing low temperature throughout the year at the poles. The sub polar low pressure more developed & regular in the S-hemisphere while it is broken in

the N- hemisphere because of over dominance of water in the former. Example one center Aleutian island in the Pacific Ocean & the other center between Greenland & Iceland in the Atlantic Ocean.

4. Polar high pressure belt:-

High pressure persists at the poles throughout the year because of prevalence of very low temperature (below freezing point) all the year round. In fact both the factors, thermal and dynamic operate at the poles. Polar High pressure Belt is small in area & spread outwards from the poles.



The global pattern of planetary wind systems.

Que14: Give the detailed classification of Wind?

Ans: Wind is the horizontal movement of air, from one place to the other or one latitude to the other and are parallel to the earth surface is called winds.

Classification of winds:

1. Primary and Planetary winds:

Those are the planetary winds which blow extensively over continents & oceans from high pressure to low pressure areas in the same direction throughout the year.

(i) Trade winds or Easterlies:

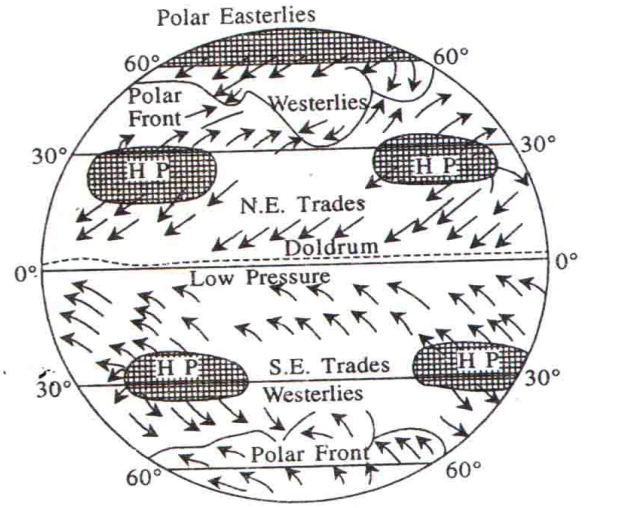
They blow from subtropical high pressure areas towards equatorial low pressure areas between 30^0N to 30^0S over the globe.

(ii) Westerly's:

Winds blowing from the horse latitude Sub-tropical high pressure belt to temperate low pressures. They blow form S-W to N-E in the southern hemisphere. They are best developed in 40^0S to 65^0S latitude. Due to tremendous speed in S-hemisphere they are known roaring forties, furans fifties & shrieking sixties –dreaded terms for sailors.

(iii) Polar Easterlies:

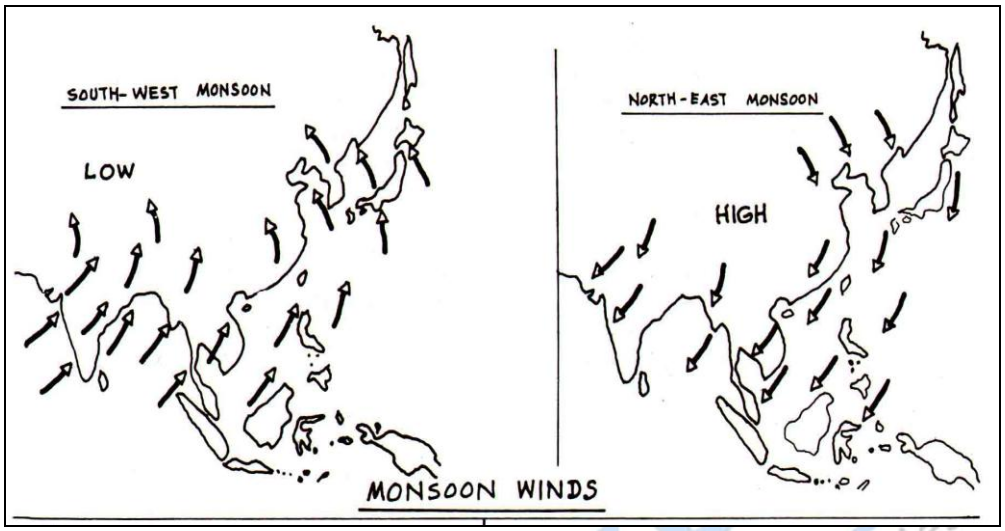
They blow from polar high pressure regions to the sub polar low pressure regions. Their direction to N- hemisphere is from N-E to S-W from S-W to N-E in S-hemisphere.



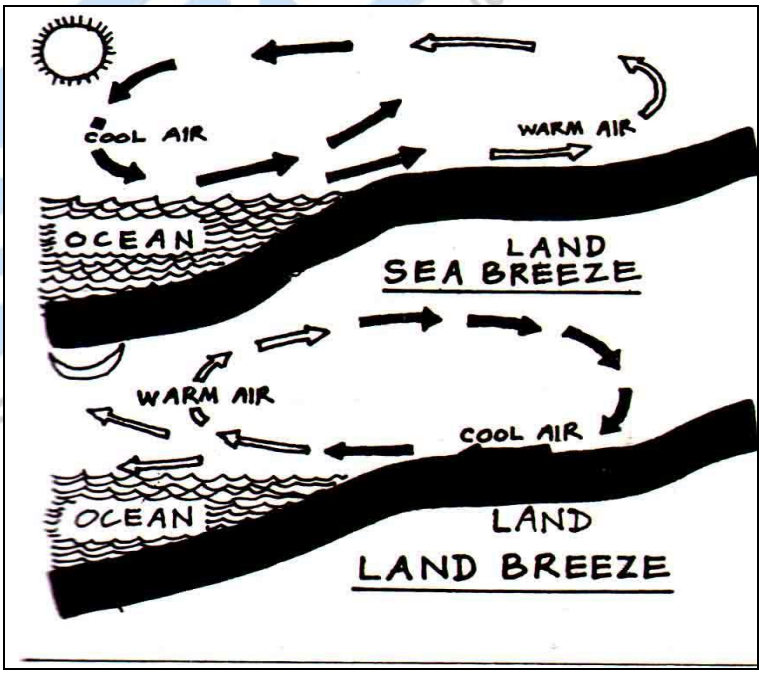
The generalized global pattern of planetary winds.

II. Secondary or Periodic winds: - These winds change their direction with change in season.

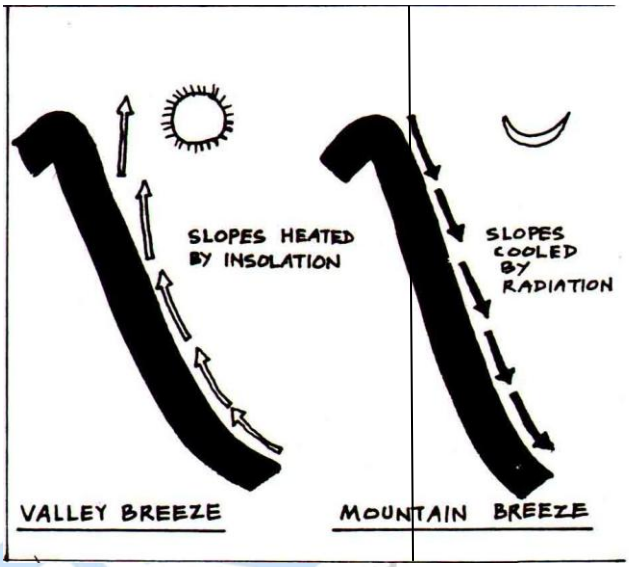
1. Monsoons winds: The word 'Monsoon' indicates the winds in the areas where they change their direction twice every year. It refers to such an atmospheric circulation which reverses its direction every 6 months.



2. Land & sea breezes: Representing a complete cycle of diurnal winds, they change their directing twice in every 24 hours .sea breeze blows from sea to kind during day time& land breeze moves from land to sea during weight due to differential heating & cooling of land and water.



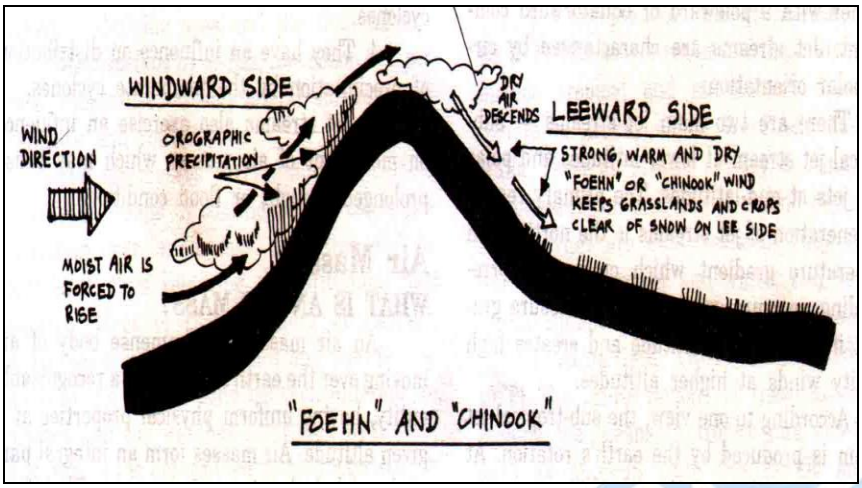
3. Valley breeze & Mountain breeze: During day time the slope of mountain is heated more than the valley flows. As such air from the valley flows up the slope is called valley breeze. After sunset, the pattern is reversed .Rapid loose of heat along mountain stops resulting sliding cold dense air from higher elevation to valleys. This is called mountain breeze.



III. Local winds: local differences & temperature and pressure produce local winds. Such winds are local in extent and are confined to the lowest levels of the troposphere.

1. Foehn: is a hot wind of local importance in the Alps. It is strong justly, dry & warm wind which develops on the leeward sides of the mountains.

2. **Chinooks:** winds in U.S.A. & Candia move down the west slopes of Rockies become warm & dry are called Chinooks.



3. Harmattten: The warm & day winds blowing from N-E to E-W in the eastern parts of Sahara desert are called Harmattan. These winds are become extreme dry.

4. Sirocco: is a warm, dry & duty local wind blows in northerly direction from Sahara desert. After crossing over Mediterranean Sea reaches Italy, Spain etc. This wind is the major agent of cyclonic stream in Mediterranean Sea.

5. Loo: It is hot and dry wind of N-India and Pakistan blows from west in the months of May to June.

6. Mistral: It is a cold local wind which blows in Spain & France from N-W to S-E directs. It is channeled through the Rhine valley.

7. Bora: is an extremely cold and dry wind blows along the share of Adriatic Sea. Bora becomes more effective in north Italy where it descends through the southern slopes of the Alps.

8. Blizzard: is a violent stormy cold and Powderly polar winds polar blows in N and S Polar Regions, Siberia, Canada & U.S.A.

Que15. Give the climate classification of Koeppen's?

Ans. Koeppen's scheme of climate classification of the word is empirical & based on numerical values. Thus is a quantitative scheme. His climate divisions generally coincide with vegetation divisions.

A. Humid Tropical: Winterless climate, warm throughout all month's temperature above 18^0c.

Af: Tropical Rain forest or Equatorial climate: This type of climate is experienced over equatorial region. Mean annual temperature exceeds 27^0C. It means warm throughout the year rainfall is abundant 250cm. These factors support luxuriant vegetation

Aw : Tropical Savanna : Mean annual temperature is 23^0C example rainfall is 160 cm. wet summers (due to convectional rainfall) alternate with dry winters (due to influence of trade winds). Floods & droughts are common.

Am: Monsoon type: Hot seasonally heavy /excessive rainfall (summers). Found over Pacific coast of Colombia, Guinea coast of West Africa, S.E. Africa, S.E. Asia.

As : Dry Summer: This is a rare climate type. Central areas of eastern coast of South India day during summer monsoon because they lie in rain shadow areas & receive winter rainfall from retreating monsoon.

B: **Dry Climate:** Potential evaporation exceeds precipitation & constant water deficiency is experience.

Bwh : Tropical hot Desert : Mean average temperature is 38^0C. & rainfall scanty .These regions are dry because of sub-tropical high pressure conditions. Vegetation varies with the soil type and marked stability of sub-tropical anticyclones.

Bwk : Mid- latitude Desert : Cool & cold desert. This is prevailing over Taklimakan (china) & Gobi (Mongolia).

Bsh &Bsk: Semiarid & steppe: These climatic conditions are experienced in the deep interiors of landmasses such as Eurasia & North America. Mean are temperature is 21ºC & rainfall merge 30 cm.

C: Humid mesothermal / warm temperate Rainy: Mild winters, warm temperature of coldest month is below 18^0 C but above -3^0C both simmer & winter are found.

Cfa : Humid sub-tropical or china type climate : Average annual temperature is 20^0 & rain fall 100cm, which is well distributed . Summers are hot & humid & winters are mild.
Cfb : Marine West Europe climate : W. European type mild winter , moist all seasons , warm summers.
Cs : Mediterranean climate : Mean temperature during summers is 20^0C -27^0C , Summer are warm & dry due to subtropical high pressure conditions. During winters the temperature is 4^0 to 10^0C are mild & rainfall 40-60 cm.

D: Humid micro thermal or cold forest climates: Severe winters mean temperature of coldest month is below -3^0C & the warmest month is 10^0C.

Df: Cool East Coast climate: Summers are hot & humidity under the influence of tropical maritime air mass with a mean temperature of 25^0 C , winters are cold with mean temperature between $^-4^0$C & 0^0C . Snow fall is experienced in winters.

Ds: Taiga Climate: 'Taiga' actually refers to the soft wood coniferous forest cover. The climate of this region is influenced by

continental pleas air mass. Summers are short meaning temperature is 10^0c-15^0c & winters are cold and long.

E: Polar Climate: Temperature of warmest month is below 10^0c .There is no warm season.

ET: Thunder Climate: spread over Arctic Ocean short, cool summers occur with long, cold winter's precipitation is meager.

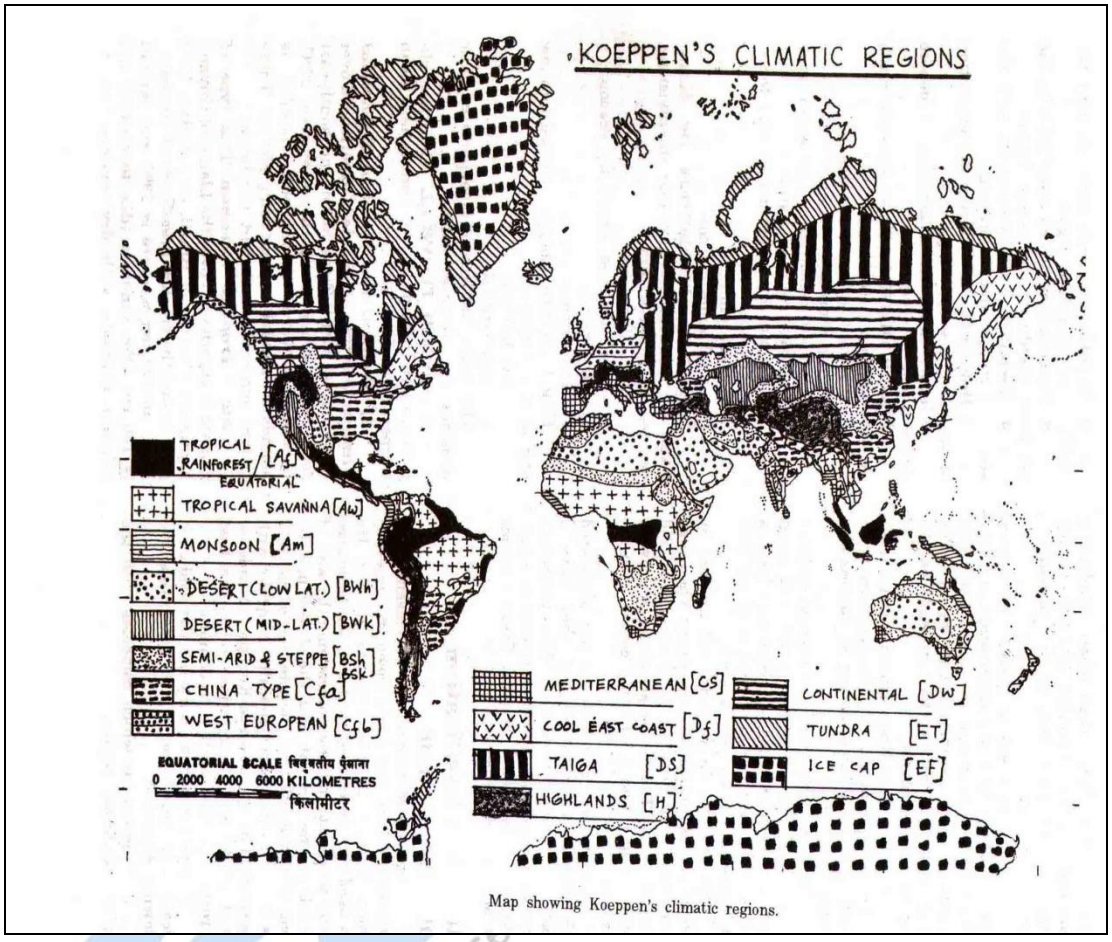
Ef: Ice cap: There is an areas permanently covered with snow. Average temperature of warmest month is below 0^0c. These conditions occur over the poles & the interiors of Greenland.

Advantages:

1. The basis on which the scheme is designated i.e. temperature & precipitation is simple to measure.
2. It is based on statistical parameter each region is precisely defined.
3. New classes of climate can be easily added.
4. The schemes use only three alphabets to represent climatic type. It does not use long and complex sentences.

Dis advantages:

1. The scheme ignores the causative factors of climate.
2. Mean monthly values of temperature & precipitation can only be estimated rather than measured effectively.
3. There is no complete agreement between the distribution of natural vegetation & climate. This is to be expected since factors, other than average climate conditions (e.g. soils), affect the distribution of vegetation.



Map showing Koeppen's climatic regions.

Que.16 Explain Front? And also explain its types.

Ans: A front is a narrow zone of convergence where 2 different types of air masses i.e. cold &dry and the warm and moist air converge.

Here the change from one type of air mass to another is sufficient to be represented conveniently by a line in a weather map.

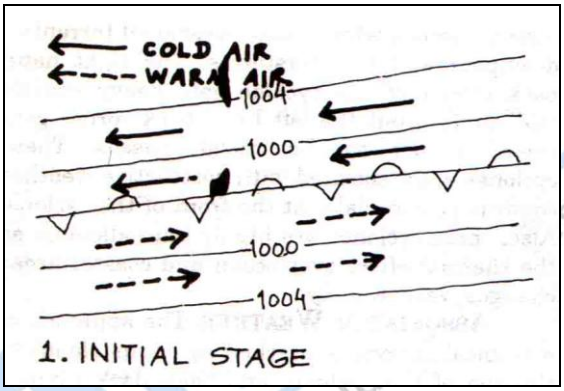
Frontogenesis: The process associated with the creation of new fonts or the regeneration of decaying fronts already in existence is called frontogenesis. The region having convergence of contrasting air masses is called the region of frontogenesis.

Frontolysis: The process of destruction or dying of fronts is called frontolysis.

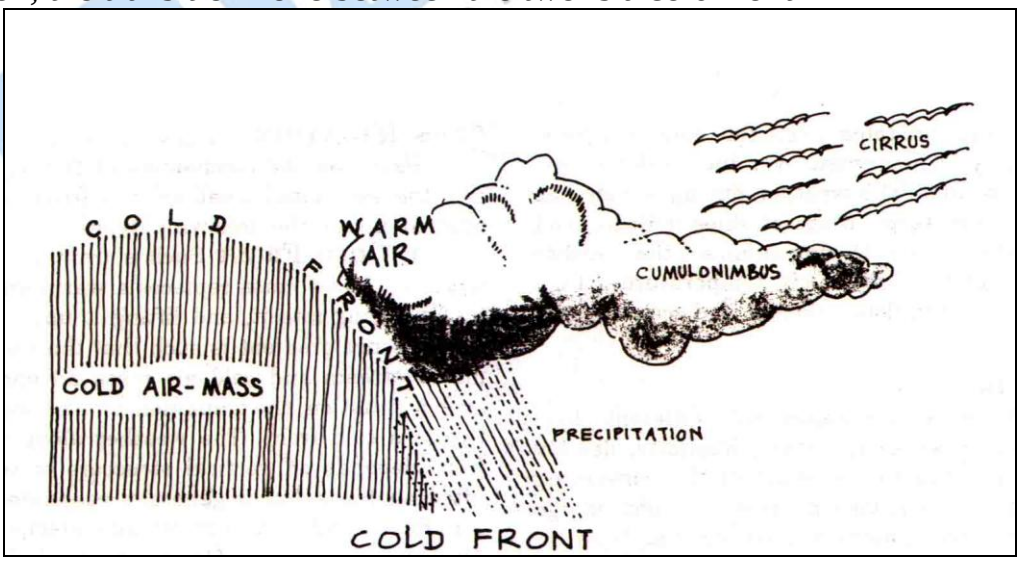
Classification of Fronts

Based in the Mechanism of frontogenesis & the associated weather, the fronts can be studied under the following types:

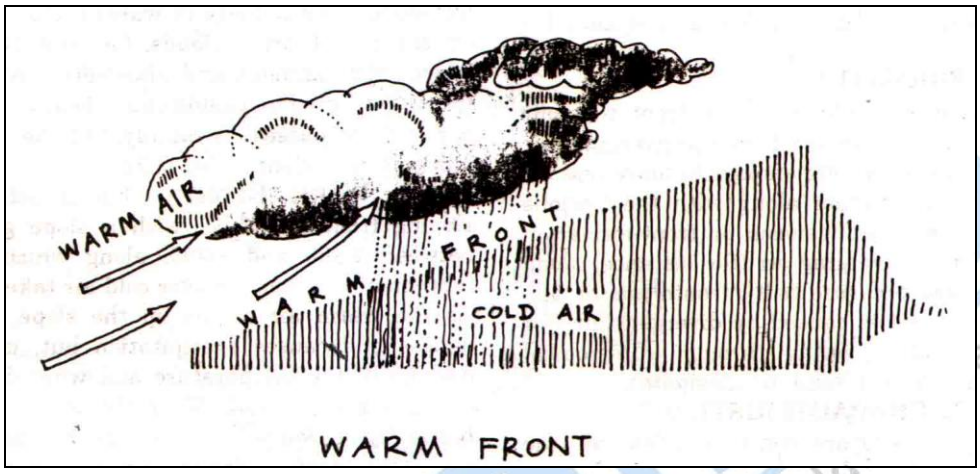
1. Stationary Front: is formed when two contrasting air masses converge in such a way that they become parallel to each other & there is no ascent of air. The surface position of stationary front does not move either forward or backward backward.



2. Cold Front: Such a front is formed when cold air masses replace a warm air mass by advancing into it, and lifting it up or when the pressure gradient is such that the warm air mass retreats & cold air advances. In such a situation, the transition zone between the two is a cold front



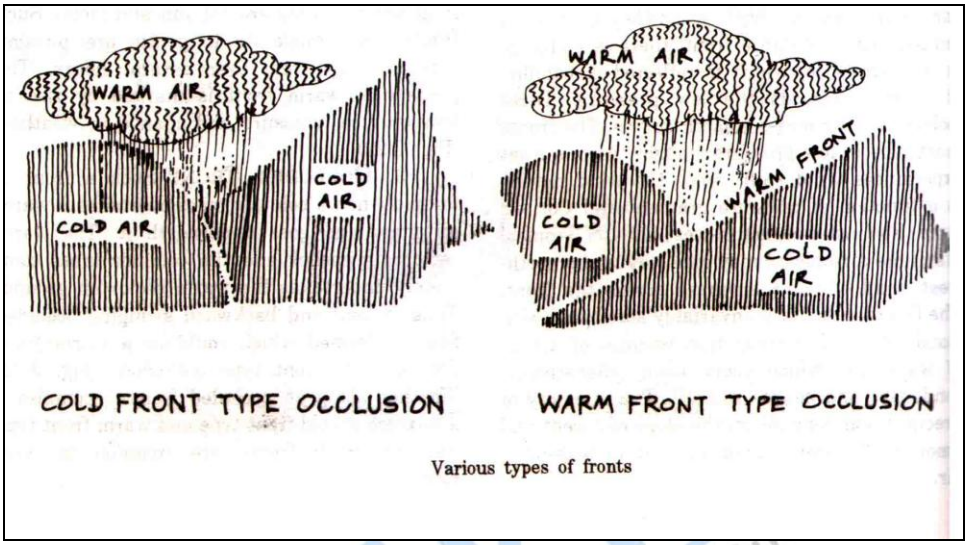
3. Warm Front: It is actually a slopping frontal surface with a slope gradient between 1:100 & 1:200 along which active movement of warm air over cold air takes place. As the warm air moves up the stops, it conduces & causes precipitation.



4. Occluded Front: is formed when cold front over takes warm front & warm air is completely displaced from the ground surface.

a) **Cold Front Occlusion**: When the cold air behind the cold front, is colder than that of the cold air advance of the warm front.

b) **Warm Front Occlusion**: When the cold air behind the cold front, is warmer, than that of the cold air in advance of the warm front.



Various types of fronts

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Section C
OCEONOGRAPHY

Water is by far the commonest liquid on earth. Including that in the solid state trapped in ice caps and glaciers, it covers about 74% of the earth's surface.

Que: What are the causes of salinity in the ocean and give an account of its amount in open closed & practically closed seas.

Ans: The presence of salt in the Oceanic water is called 'salinity' .Generally salinity is defined as the total amount of solid material in grams contained in 1kg. Of sea water (means 30 Gms of salt in 1000gms of sea water). The oceanic salinity not only affects the marine organisms and plant community but it also affects the physical properties of oceans such as temperature ,density, pressure, waves & currents etc.,. The freezing point of ocean also depends on it e.g. more saline water freezes slowly in comparison to less saline & the boiling point of saline water is higher than the fresh water. Salinity also increases the density of sea water. Evaporation is also controlled by salinity as it is lower over more saline water than over less saline water.

Sources of Oceanic Salinity:

1 Basically the source of Oceanic salinity is Land.
2 River brings salts in solution form from the Continental areas.
3 Volcanic ashes also provide some salt to the Oceans.

I) **Horizontal distribution**: In this, the pattern of latitudes & regional distribution & also the distribution of salinity in enclosed, practically enclosed & open seas are also considered.

1. Latitudinal Distribution: - On an average salinity decreases from equator to -words the poles. High salinity is recorded near e.g. because this zone records high temp & exploration but high rainfall reduces the salt. These eg

.accounts only 35‰ salinity .The highest salinity is observed between 20^0-40^0N (36^0) because this zone have high temp high evaporation but significantly low rainfall. Salinity further decreases in the polar zones because of melt water.

2. Regional distribution: On the basis it is divided in to three

1. Seas having salinity above normal-: (i) Red Sea (34-41‰)
   (ii) Persian Gulf (37-38‰)
   (iii) Mediterranean Sea (37-39‰)
2. Seas having normal salinity: -(i) Caribbean Sea & Gulf of Mexico (935-36‰)
   (ii) Bass strait (35.5‰),
   (iii)Gulf of California (35-35.5 ‰)
   (ii) N-Australian Sea (33-34 ‰)
   (iii) China Sea (25-35 ‰)
   (iv) Japan Sea (30-34‰) etc.

2. Much below: (i) Baltic Sea (3-15‰)
   (ii) Hudson bay (3-15‰)

Distribution of Salinity in Pacific –Ocean

There is a wide range of salinity differences in the Pacific Ocean because of its shape & larger areal extent. It has the maximum Salinity of 35 per thousand occurs bet 15^0 & 30^0 latitude north & South of the equator .In the higher latitude in the western & north ward part of Pacific ocean it becomes 31‰ in Okhotsk sea & 34‰ near Manchuria because of influx of melt water brought by the oyshio current coving from bring sea & due to weakening of Kuroshio warm current.

Salinity also decreases along the Californian, Middle American & Peruvian coast due to transfer of water & upwelling of cold water .Low water salinity is noted in front of river.
Months (yellow river=30‰ & Yangtzekiang=33‰)

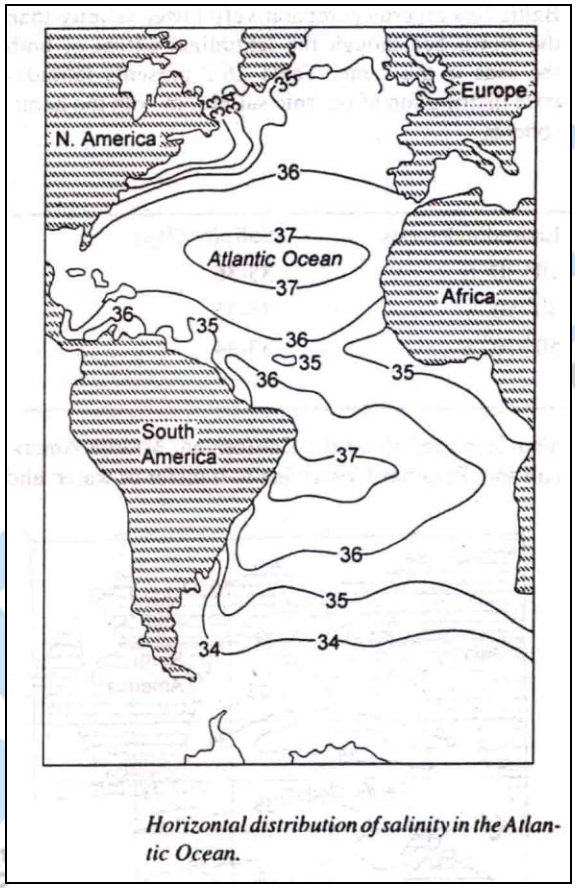
Distribution of Salinity in Atlantic Ocean

The average salinity of Atlantic ocean is 35.67‰ .It is recorded between 5^0N, 15^0N & 15^0S as 34.98‰, 36‰ & 37.77‰ respectively indicates increasing trend of salinity from equator towards the tropics of cancer & Capricorn. The central zone of the North Atlantic Ocean located between 20^0N & 30^0N & 20^0W -60^0W records maximum. Salinity (37‰) & it decreases towards north -ward but varying trends. The eastern margin areas of N-Atlantic beyond 40 latitude record higher salinity in compare them the western margin because the Gulf Stream carries saline water from the American coast to the north -western European coast. Salinity is higher along the western margin than the eastern margin between 10^0-30^0 in the south Atlantic because of upwelling of water along the African coast. Low salinity is found in front of River mounts. (St.lawerance=31‰Amazan 15‰, Congo=34‰, Niger=20‰, Rhine 32‰ etc.)

The pattern of spatial distribution of salinity is quite different in the partially enclosed seas of Atlantic Ocean. The North Sea in spite of its location in higher latitude records 34‰ salinity due to more saline water brought by the N- Atlantic Drift. On the other hand Baltic Sea records low salinity due to supply of river water. Further northward salinity continues decreases as it becomes 7 to 8‰ around Rugen Island. It becomes as low as 2‰ in the Gulf of Bothnia due to influx of fresh water. The Mediterranean sea it records high salinity due to evaporation & little mixture of Atlantic water .In its western part of this sea salinity increases 36.5‰ to the eastern part (39‰) but it is remarkably recorded to

17-18‰ in black sea due to fresh water brought by Dnieper ,the Danube etc.

There is high salinity in Gulf of Mexico (36 ‰) & the Caribbean Sea due to more saline water brought by the north equatorial current.



Horizontal distribution of salinity in the Atlantic Ocean.

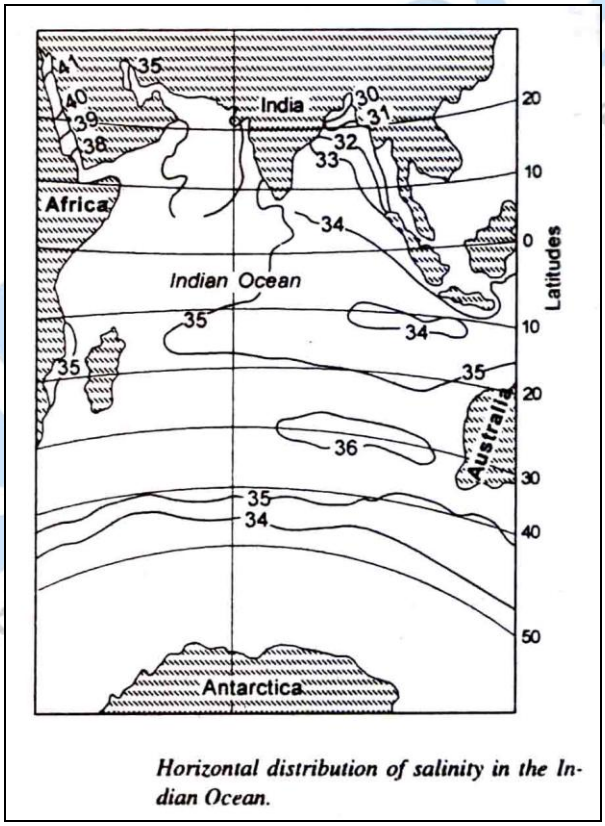
Distribution of Salinity in Indian Ocean

An average salinity 35 ‰ is found between 0^{o}-10^{o} N and it decrease north word in the Bay of Bengal (33.5‰ at 10^{o} N latitude to 30 ‰ at the mouth of the Ganga.) because of fresh water brought by Ganga River. On the other level the Arabian Sea records higher salinity

(36‰) then Bay of Bengal because there is higher rate of evaporation, low humid condition and low fresh water supply .The western coast of Australia records higher salinity due to dry weather .The partially enclosed seas has higher salinity e.g. It is 37‰ at the head & 40‰ in the interior of Persian Gulf.

The red sea records the highest salinity because of low perception & very high evaporation.

Salinity is devoted in Oceans & seas is represented by isohalines .Which are the lines that join the places of equal salinity at the sea surfaces.



Horizontal distribution of salinity in the Indian Ocean.

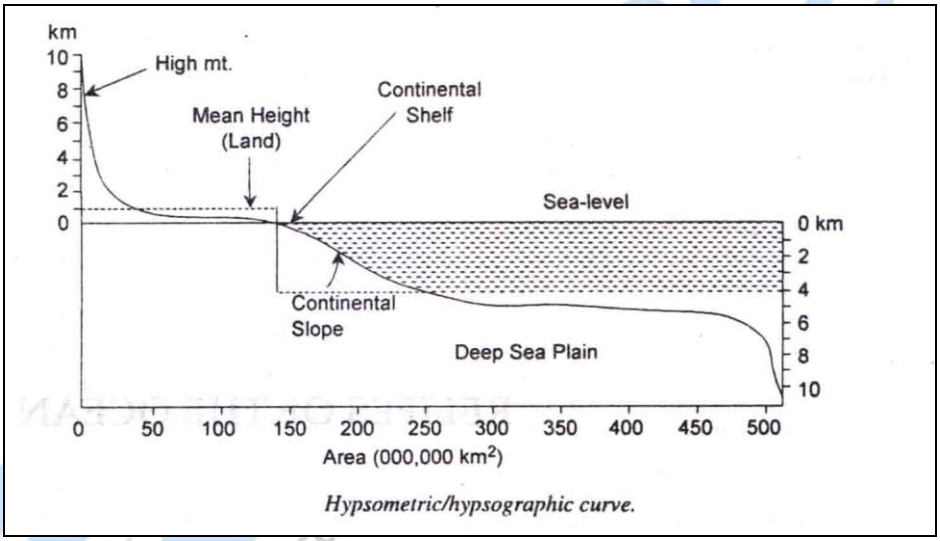
Que. Give a brief account on the Reliefs of Ocean Basin.

Ans Total area of globe =50.99crore square km or 509,950, 000km²

Area covered Lithosphere = 361,060,000km²

Area covered Hydrosphere =148, 890, 000km²
Water resources =70.8 % and Land = 29.2%
Pacific Ocean =165, 000, 000km²
Atlantic Ocean=82,000,000km²
Indian Ocean = 73,000,000
Average Depth of Ocean =3,800m

The different height & depth zones of the lithosphere & hydrosphere are represented by Hypsographic or Hypsometric curve.



Hypsometric/hypsographic curve.

There are four relief zones in ocean basic:-

1- Continental shelves 2-Continental slopes
3- Deep sea plains 4-Oceanic trenches

I. **Continental shelves -:** The continental marginal areas submerged under oceanic water with average water depth of 100 Fathoms & gently sloping 1^0-3^0 towards the sea or oceans are called continental shelves cover 8.6% of

total ocean basin. The North Sea & Baltic Sea are examples of seas that lie in continental shelf

Origin of Continental Shelves:-

1. They are basically extended form of continental platforms. Marine waves and currents erode the continental margins & thus form extensive plat forms which receive deposits of sediments brought down by the rivers & sea waves. Thus this is the result of marine erosion & fluvial deposits.
2. They are formed through sediments deposited by rivers. Such type of continental shelves is formed only in these areas where sea conditions are calm.
3. Rising thermal connective currents form beneath the continents .The resultant compressive force causes subsidence of the continental margins & thus continental shelves are formed.
4. Parallel faults created in the continental margins. This event causes subsidence of the marginal land areas & consequent submarine under sea

5 Continental shelves are formed through marine erosion of the continental margins where there is a negative change in sea level due to subsidence of oceanic floor.

6 The submerged of continental margins due to tilting of land towards the sea results into the formation of continental shelves.

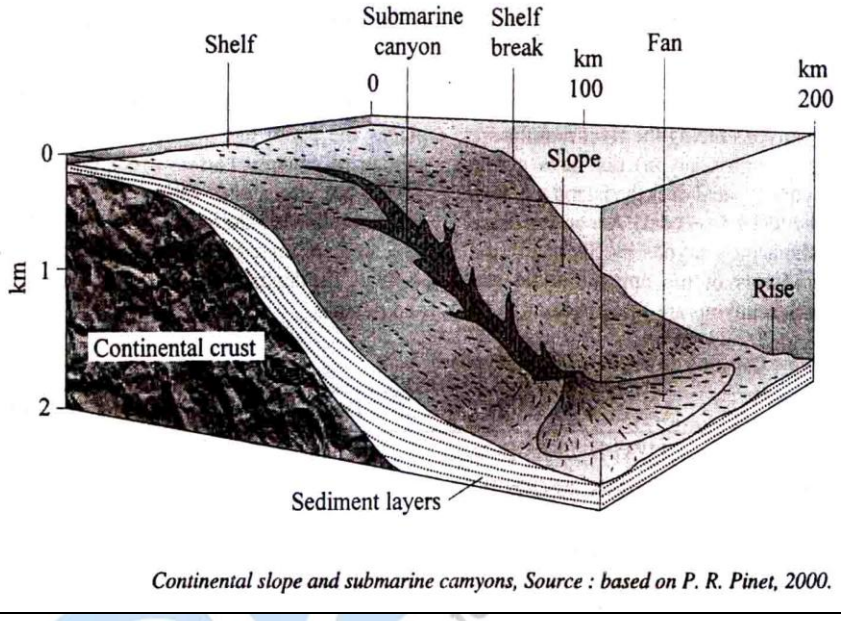
II **Continental Slope: -**

The zone of steep slope extending from the continental shelf to the deep sea plains is called continental slope. It Occupy only 8.5% of the total area of ocean basing but it varies from one ocean to other e.g.,- Atlantic Ocean 12.4%, Pacific Ocean=7% & Indian Ocean=6.5%

Origin of continental slope

1- Slopes are formed due to erosion by marine processes mainly sea waves.

2- According to tectonic theory faulting is hold responsible for the origin of continental slope.
3- Some exponents believe that the continental slopes are formed due to bending & warping of continental shelves followed by sedimentation.
4- The most extensive continental slops are formed bet 20°N & 50°N latitude and & 80° N & 70° S latitude.



Continental slope and submarine camyons, Source : based on P. R. Pinet, 2000.

III **Deep Sea Plains: -**

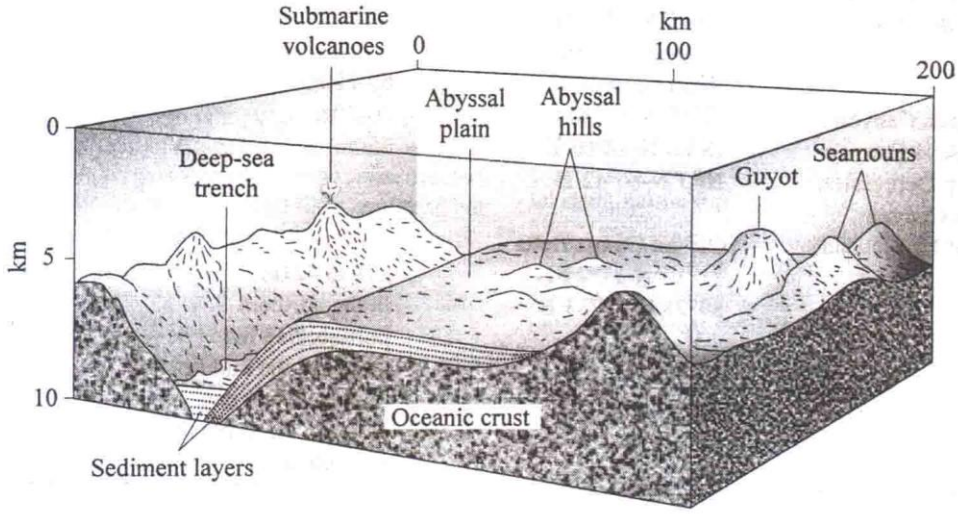
Deep sea plain characterized by flat & rolling submarine plain is the most extensive relief zone of the ocean basses. The depths of these plains 3000m to 6000m cover 75.9% of the total area of ocean basins.

Mid-Atlantic ridge, east pacific rise, & mid Indian Ocean ridge are typical examples.

IV **Ocean Deeps:** - Ocean Deeps representing depressions & trenches on the Ocean floors are the deepest zones of the ocean Basins. Phase are generally located parallel to the coasts facing mountains & along the islands. They are of 2 types.

1. Very deep but less extensive depressions are called deeps.
2. Long & narrow linear depressions are called trenches.

Mariana trench located to the west of Philippines in the North Pacific Ocean is the deepest (11.02 km deep) of all the Ocean deeps.



Morphology of ocean basins, source : based on P. R. Pinet, 2000.

Q-1 what are coral reefs? How are they formed?

Ans. Coral reefs and atolls are significant sub-marine features. These are formed due to accumulation & compaction of skeletons of lime secreting organism's known as coral polyps .Coral raffs are formed due to formation of one shall upon another shell along submarine platforms at suitable depth.

Conditions for the Growth of Coral Polyps:-

a. Corals require high mean annual temp ranging bet 68^0 F and 70^o F (20^0c to 21^0c) So they mainly found in the tropical

oceans & seas. They cannot survive in the waters having either very low temperature or very high temperature.

b. Corals require not more then 200-250 feet (60-77m) depth of water, because they die in much deeper water due to lack of sufficient amount of sun light & O_2, Which are very essential for the growth of coral polyps.

c. They required sediment free fresh water because muddy water clogs the mouths of coral polyps.

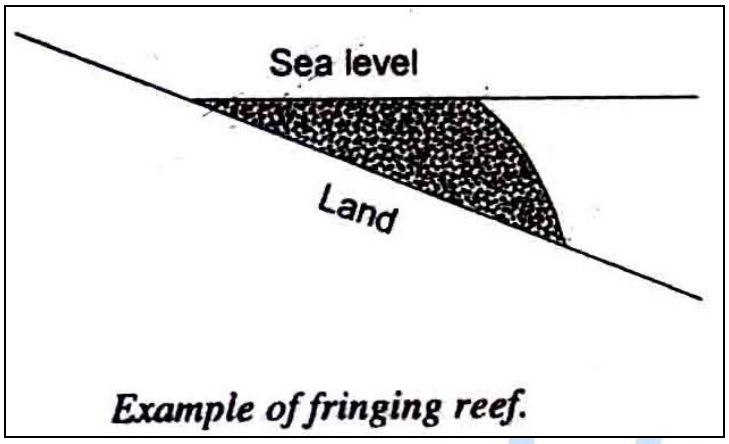
d. Complete fresh water is also injurious for their growth. This is why corals avoid coastal lands & live away from the areas of river mouths.

e. Complete saline water is injurious for their growth, because such water contain little amount of calcium carbonates whereas lime is important food of coral. The oceanic salinity bet 27 ‰ to 30 ‰is most ideal for their growth

f. Oceans currents & waves are favorable for corals because they bring through transportation food supply for the polyps. Current & waves also determine the shape of corals.

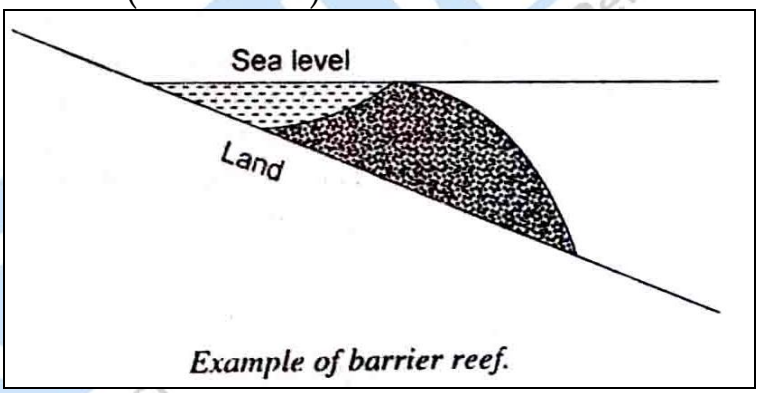
1. **Fringing reef** - Coral reefs developed along the continental margins or along the islands are called Fringing reef. The seaward slope is steep & vertical while the land ward slope is gentle .The upper surface is in uneven.

   For example: - Sakan island, South Florida, Mehetia island.



Example of fringing reef.

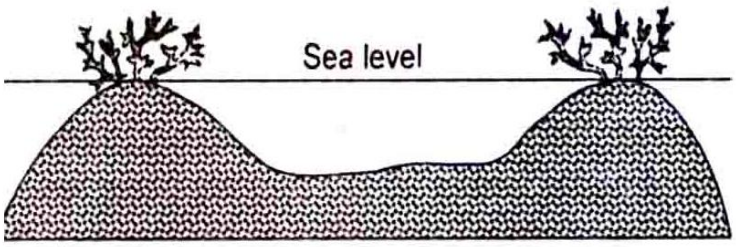
2-**Barrier Reef-:** The largest coral reefs off the coastal platforms but parallel to them are called Barrier Reef. The average slope is about 45. e.g. Great Barrier reef, located parallel to the east west of Australia is world highest Reef (1200 miles)



Example of barrier reef.

3-**Atoll** -: A ring of narrow growing corals of horse- shoe shape & crowned with palm trees is called atoll .It is generally a found around an island or in elliptical form on a submarine platform. There is a lagoon in the middle of coral ring .They are found in Real sea, China Sea, Antilles sea, Indonesian sea.

Example: - Shallow lagoon reefs are minor reef in world located in South China Sea.



Example of an atoll.

Atolls - This is mainly divided into 3 types.

(i) True Atoll - Characterized by circular reef enclosing a shallow lagoon but without island.

(ii) Island Atoll - Having an island in the central part of lagoon enclosed by circular reef.

(ii) Coral island or Atoll Island - Does not have island in the beginning but later on island is formed due to erosion & deposition by marine waves.

On the base of location:-

(i) **Tropical Coral Reef:-** They are mainly found in tropical zone formed in Atlantic Ocean, Indian Ocean, Pacific Ocean. Due to warm air flows in the eastern part of N. America, S. America, Australia they are formed.

(ii) Marginal belt Coral Reef: - They are founded in 250^0 N-30^0 to 32 S. Example are Bermuda, Bahamas, & Hawaii Island.

Que: Explain the different Theories for the origin of Coral Reefs.

Ans **Stand Still Theory Of Murray**: - Theories based on the concept of Non -subsidence or stand still situation of land fall in 2 categories.

(i) First group: - Corals grow upon suitable stable submarine platforms with unchanging sea level.

(ii) Second group :- Necessary suitable submarine platform become available due to lowering of sea level & consequent erosion of land by sea waves but land always remain stable.

The theory of Murray belongs to the first group:-

Murray propounded his theory of formation of coral reefs in the year 1880 .on the basis of the information received during challenger expedition.

According to him:

1-Coral polyps can live up to a depth of 30 fathom.

2-Sea level & submarine platforms are stable.

3-Several submarine plat, volcanic peaks, islands are present below sea level.

(I) If the submarine land platforms are above the permissible depth for the survival of coral polyps they are subjected to wave erosion & solution, so that there heights are lowered down.

(II) If the submarine platforms are below the required depth of sea of 30 fathoms, their height is increased due to deposition of marine sediments.

4. After getting suitable foundation at required depths of 30 fathom. Coral polyps began to grow upward along the coast & fringing reef is formed.
5. Outward growth results in growth of barrier reef in due course of time.
6. Atolls are formed due to outward growth of corals in all directions at the top of submarine platforms .Thus a ring is formed around a solution lagoon.
7. Lagoon wards coral -dead seaward -growing /living.

EVALUTION OF THEORY:

1- Requires numerous suitable sub marine platforms at a depth of 30 fathom, but this is not possible.
2- Two contradictory possibilities not possible i.e., deposition & erosion on submarine platforms.
3- A limit of 30 fathom for deposition & erosion cannot be accepted.
4- Lagoon formed due to solution of coral (dead) not acceptable because the pelagic deposited down on the submarine platforms or peaks would also be dissolved.
5- If the submarine platforms are stable then the lagoons would be completely filled up with the marine sediments & disappear.
6- According to Murray coral reefs cannot be found beyond a depth of 30 fathom, but contradiction is found.

2. **Subsidence Theory of Darwin –**

Charles Darwin postulated his subsidence theory first in 1837, modified in the 1842, during his voyage on the 'Beagle'.

Observation & Conclusion –

1. Darwin was convinced that coral polyps could grow only in shallow oceanic waters, though coral reefs were found at greater depths where coral polyps could not survive at any cost.

2. Darwin postulated his theory in order to solve the riddle of the contradiction.

According to him:
The land or island involved in the origin & growth of coral reefs is seldom stationary rather it under goes gradual subsidence.
Fringing reefs, barrier reefs & atoll's are successive stages of the development of coral reefs.
Origin of Coral reef according to Charles Darwin
A1-A1- Sea level, fringing reef
A2-A2- Sea level after subsidence barrier reef
A3-A3- Sea level after composition submergence & Atoll.

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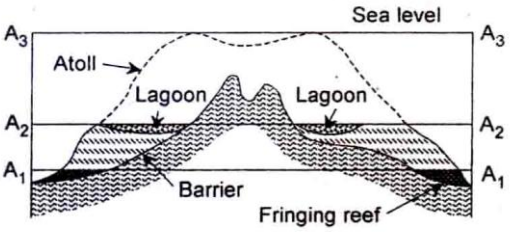
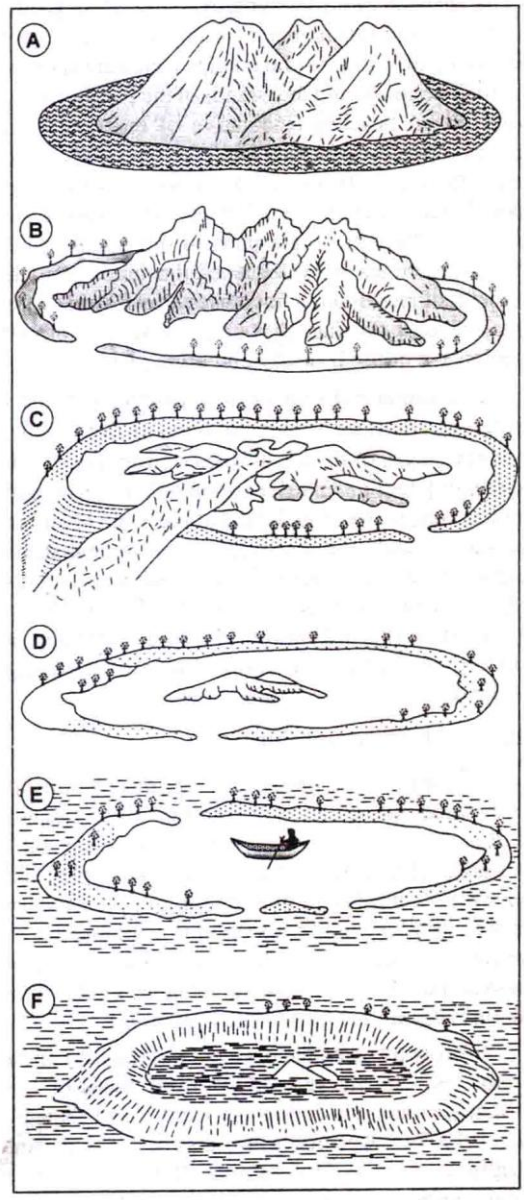


Origin of coral reefs according to Charles Darwin. A_1-A_1 = Sea-level and the formation of fringing reefs, A_2-A_2=sealevel after subsidence and the formation of barrier reef and A_3-A_3 = sealevel after complete submergence of the island and the formation of atoll reef.

Stages of theory:

1. Coral polyps clog around/along a suitable submarine platform, grow upward, fringing reef formation (stable condition of land)
2. Land is subjected to subsidence because of tectonic forces, coral polyps also reach greater depth (where they may not survive.) Consequently they grow upward & outward at much faster rate so that they can get food for survival growth is related toward the land. A lagoon is formed between them. Fringing reef is formed between them. Fringing reef is formed.
3. There is further subsidence of land and the island is completely submerged on a ring in coral reef in the form of atoll is formed.

   Darwin did not invoke sudden and rapid subsidence of land, his conceived gradual & slower rate of land subsidence then the upward rate of growth of corals.



Stages of the development of coral reefs and atolls on the basis of subsidence theory.

Criticism of the theory

1. If barrier reef, fringing reef and atoll reefs maintained by Darwin are only 3 stages of the evolutionary growth of a reef, then fringing reef of barren should not be found on either side of the same island at the same level.
2. If subsidence theory is accepted then most of the islands of the Pacific Ocean would be submerged.
3. There are also some evidences of the existence of coral reefs associated with the emerging islands.

3. Glacial Control theory of Daly

Daly propounded his theory of coral formation in the year 1915 after he was convinced that coral reefs were formed after Pleistocene Ice Age.

According to him:

1. Sea level fell by 33 to 35 fathoms due to glaciations (Confinement of sea water in the form of ice on the continents).
2. The existing corals died due to lowering of temperature of marine water.
3. Wave cut platforms were formed along continental coasts and islands due to abrasions by sea waves.
4. After end of ice age sea level again rose by 33 to 35 fathoms due to return of sea water (by melting of ice on the continents).
5. Thus the wave cut platforms were submerged up to the depth of 33 to 38 fathoms.

6. The corals which were able to survive during ice-age, began to grow outward and upward and sea ward edges of submarine platform.
7. Fringing reef was formed on broad wave eroded platforms, while barrier reefs were formed on broad wave cut platforms.
8. Lagoons of uniform depth were formed between the reefs and the land because of uniform lowering of sea level due to glaciations during Pleistocene Ice age.

Evaluation of the theory-

1. All the lagoons of atolls & barrier reef should be uniform but actual observation do not validate this concept.
2. The cliffs formed during glacial period should also be present but they are seldom found.
3. If all the marine islands, were eroded up to 33 to 38 fathoms then there should not be islands between the coasts & coral reefs but numerous such islands are formed.

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Multiple Choice Questions

Set 1

1. The study of Universe on grand scale is called _____
   a. Universe
   b. Earth
   c. Galaxy
   d. Milky Way
2. What form does the Milky Way Galaxy has
   a. Spiral
   b. Elliptical
   c. Irregular
   d. Barbed
3. If Sun dies it will be transformed into a _____
   a. White dwarf
   b. Black dwarf
   c. Quasar
   d. All of the above
4. The most important constituent of the Sun's mass is ___
   a. Hydrogen
   b. Helium
   c. Silicon
   d. Iron
   i) 1 and 2
   ii) 2 and 3
   iii) 3 and 4
   iv) 1,2 and 3
5. Which of the following not a plant of a Sun
   a. Mercury
   b. Mars
   c. Sirius
   d. Earth

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6. Name the biggest Planet of the Sun
   a. Earth
   b. Saturn
   c. Jupiter
   d. Mars
7. Which planet is approximately thirty times farther from the Sun than Earth is?

a. Saturn
b. Uranus
c. Neptune
d. Jupiter

8. Which planet takes more time to complete one rotation on its axis than to complete one revolution around the Sun?

a. Mercury
b. Venus
c. Mars
d. Jupiter

9. Energy is transferred from the Sun to Earth mainly by
   a. molecular collisions
   b. density currents
   c. electromagnetic waves
   d. red shifts
10. Which planet has an orbit with an eccentricity most similar to the eccentricity of the Moon's orbit around Earth?
    a. Earth
    b. Jupiter
    c. Pluto
    d. Saturn

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Set 2

1. When the Earth is at its maximum distance from the Sun it is called
   a. Aphelion
   b. Perihelion
   c. Equinox
   d. Sidereal
2. The direction of the rotation of the Earth on its axis is

a. North to South
b. West to East
c. South to North
d. East to West

3. Earth can be best describe as a
a. Geoids
b. Circle
c. Sphere
d. Oblate sphere
4. What is the total number of degrees that the earth rotates on its axis during a 12 hrs period?
a. 360^o
b. 90^o
c. 180^o
d. 15^o
5. Seasonal changes on the Earth 's surface are caused by
a. Earth's rotation
b. Earth's revolution
c. Earth's rotation and inclination of its axis.
d. Earth's revolution and inclination of its axis.
6. If the earth's axis had no inclination there would have been the absence of:
a. High tides
b. Neap tides
c. Deflection of wind direction
d. **Changes in the duration of day and night**.
7. Which planet has the largest number of satellites?
a. Jupiter
b. Uranus
c. Neptune
d. Saturn
8. The age of the Earth is about:
a. 1.8 billion years
b. 2250 million years
c. 4.5 billion years
d. 1950 million years
9. All the planets revolve around the Sun in an elliptical orbit in the _____ direction.

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a. Clockwise
b. Anticlockwise
c. Same
d. Variable

10. Beyond ____ the sun is never overhead at any time of the year.
    a. 40° N and S
    b. 23½° N and S
    c. 66½° N and S
    d. 25° N and S

Set 3

1. The first person to say that the earth is a Sphere was
    a. Galileo
    b. Archimedes
    c. Eratosthenes
    d. Copernicus
2. The Asteroidal belt lies between
    a. Jupiter and Mars
    b. Earth and Mars
    c. Uranus and Neptune
    d. Mercury and Venus
3. Match the following theories of the origin of the Earth and their proponents.
    1. Nebular Hypotheses A. Kant
    2. Protoplanet B. Von Wiz sacker
    3. Planetesimal theory C. Chamberlin
    4. Binary Star theory D. Russell and Littleton.

1) 1A,2B,3C,4D
2) 1C,2D,3A,4D
3) 1D,2C,3B,4D
4) 1D,2A,3B,4C

5. The name of the layer of the Earth that separates the crust from the core is the ___?

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a) Magma
b) Lithosphere
c) Asthenosphere
d) Mantle

6. What powers the Earth's internal heat engine?
   a. Radioactivity
   b. solar energy
   c. volcanoes
   d. ocean tides
7. The crust of the Earth is static and stable.
   a. True
   b. False
8. The terms **crust** and **lithosphere** are synonymous
   a. True
   b. False
9. The lithosphere is approximately _____ kilometers thick.
   a. 50-100
   b. 1-5
   c. 20-40
   d. 10-25
10. Continental Drift Theory was given by
    a. Wegner
    b. Holmes
    c. Daley
    d. Davis

Set 4

1) Granite is a-
(a) Igneous Rock
(b) Sedimentary Rock
(c) Metamorphic Rock
(d) Glacial Rock.

2) Convection Current theory of mountain building was given by-
a) Hall
b) Haug

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c) Holmes
d) Kober

3) The density of the earth as a whole is
a) Granitic Rock
b) Sedimentary Rock
c) Metamorphic Rock
d) Basaltic Rock.

4) The basic difference between oceanic and continental crust is in its
a) Asthonesphere
b) Hydrosphere
c) Oceanic block
d) Lithosphere

5) The main cause of faulting is__
a) Tension
b) Wind
c) Tidal activity
d) Glacial Rock.

6) Epeirogenic movement gives rise to
a) Folded mountains
b) shields
c) plains
d) none of these

7) Richter's scale is used for measuring the
a) Relative humidity of the atmosphere
b) Electric conductivity of water
c) Magnitude of the earthquake
d) Speed of winds

8) Surface waves in an earthquake are:
a) S- waves
b) L-waves
c) P-waves
d) P & S waves

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9) The lake formed by volcanitcity is called:-
   - **a) Caldera**
   - b) Meander
   - c) Lagoon
   - d) Tarn

10) Bay's Ballot's law is related to
   - **a) Air Pressure**
   - b) Speed of Air
   - c) Direction of Air
   - d) Temperature Air.

Set 5

1. The term 'Isostasy' was coined by:
   - a) George Airy
   - **b) C.E. Dutten**
   - c) J.H. Pratt
   - d) A.Holems

2. Median deep is associated with
   - **a) Kober**
   - b) C.E. Dutton
   - c) Pratt
   - d) A.Holems

3. Plaaeomagnetic evidences best support
   - a. Isostacy
   - **b. Contintal drift**
   - c. Kober's Theory
   - d. Holems theory

4. The main cause of Tsunami is
   - a. Volcanoes
   - b. Cyclone

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c. Earthquake on sea floors
d. Moon's attraction

5. Fujiyama Volcano is-

a. Dormant Volcano
b. Active Volcano
c. Extinct Volcano
d. None of these

6. Chromospheres is related to:
   a. Jupiter
   b. Venus
   c. Sun
   d. Moon
7. A 'rift valley' is formed by:

a. Faulting activity
b. Folding activity
c. Wind erosion
d. Water erosion

8. Thermal Contraction Theory of Jeffrey explains

(a) About the mountain building
(b) Ocean currents
(c) Desert landscape
(d) Formation of clouds

9. A geyser can be called

a. A faulting spring
b. An artesian well
c. A hot water spring
d. A mineral spring

10. Magma is

a. Liquid form
b. Gas form
c. Solid form
d. A combination of liquid , solid, gas

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Set 6

1. Which of the following is NOT an accept of volcancity?
   a. Geyser
   b. Batholiths
   c. Dyke
   d. Fold

2. Batholiths is:
   a. an intrusive volcanic feature
   b. an extrusive volcanic feature
   c. a volcanic piug
   d. a caldera

3. Physical weathering takes place in region with
   a. Dry climate
   b. Wet climate
   c. Diurnal temperature changes of greater range.
   d. Annual temperature fluctuation.

4. Which of the following do NOT belong to mechanical weathering
   a. Burrowing animals
   b. Ice wedging
   c. Sheeting
   d. Salt accumulation into cracks by sea water

5. Chemical weathering is more effective than mechanical weathering in
   a. Semi arid region
   b. Arider region
   c. Coastal region
   d. Cool temperature

6. Which of the following a concordant feature
   a. Laccoliths
   b. Phacolith
   c. Bismuth

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d. Batholiths

7. The convection current in the earth are generated in
   a. The mantle
   b. Asthonesphere
   c. Mantle plume
   d. All of the above
8. Who propounded the 'Normal cycle of erosion '.
   a. W. M. Davis
   b. Penk
   c. Homes
   d. Daley
9. Penks's name for the cycle product is
   a. Primarumpf
   b. Endrumpf
   c. Haldenhang
   d. Endslope
10. The speed of a river decreases when it enters
    b. A lake
    c. A sea
    d. A flat or gently sloping plane
    e. All of the above

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Set 7

1. Formation of an Oxbow lake is related to:-
   a) Corals
   b) Glaciers
   c) Wind
   d) Water.
2. The feature not related to winds is:-
   a) Isenberg
   b) Mushroom rock
   c) Lapis
   d) Zeugen
3. "George" topography is related with
   (a) Glacier
   (b) Underground water
   (c) Wind
   (d) Running water.
4. Maximum velocity of the occurs at
   a. Upper part of the river
   b. Middle part of the river
   c. Lower part of the river
   d. It is difficult to say
5. A waterfall provides an ideal site for
   a) Plunge pool
   b) Artificial lakes
   c**) Producing hydroelectricity**
   d) Tourism
6. The landforms which are different from the others with the mode of origin are:
   a) Alluvial Fan
   b) Delta
   c) Natural Levees
   d) **Water fall**
7. The feature related to glacier is:
   (a) Yardages
   (b) Cirque
   (c) Lapis

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(d) Gorge

8. 'Pot holes' are formed by:-
   (a) Wind
   (b) Glacier
   (c) Rivers
   (d) Waves
9. Ox- Bow lake is the result of:
   (a) Glacial erosion
   (b) River erosion
   (c) Wind erosion
   (d) Coastal erosion

10. Alluvial fans are formed
   a. Along the shore
   b. In the foothill region
   c. Of silt accumulation
   d. At meanders intersection

Set 8

1. Brahmaputra river is an example of ___ river

   a) Subsequent
   b) Obsequent
   c) **Antecedent**
   d) Superimposed

2. "Landscape is a function of structure, process and stage"
   This statement is given by
   a. J.Hutten
   b. Penk
   c. Davis
   d. Playfair

2. Moraine are the feature related with
   a. River

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b. Wind
c. Waves
d. Glaciered

3. U- Shaped valley is related with ___
   a. River
   b. Wind
   c. Underground water
   d. Glacier
4. Dreikanter is a topography related to ___
   a. Wind
   b. River
   c. Water
   d. Waves
5. Cliff is the landforms associated with
   a. Waves
   b. Running water
   c. Water
   d. Underground water
6. Blind valley is the example of ____
   a. Wind
   b. Karst
   c. Running water
   d. Waves
7. Ganga river delta is a example of
   a. Arcuate delta
   b. Bird foot delta
   c. Easturian delta
   d. Misfit delta
8. Water percolation from a facture in the roof may form a thin , vertical sheet of rock called a ___
   a. Stalacite
   b. Stalagmite
   c. Dripstone
   d. Drip curtain
9. Two or more dolines join up to give a large opening is known as
   a. Polje

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b. Uvala
c. Grikes
d. Swallow holes

10. The cresent shaped dune is also called
a. Transverse dune
b. Barchan
c. Longitudinal dune
d. Oblique dune

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1. Case study on Earthquake

A Powerful Earthquake of magnitude 6.9 on Richter-Scale rocked the Western Indian State of Gujarat on the 26th of January, 2001. It caused extensive damage to life & property. This earthquake was so devastating in its scale and suffering that the likes of it had not been experienced in past 50 years. Leaving thousands seriously injured, bruised and handicapped; physically, psychologically and economically.

The epicenter of the quake was located at 23.6 north's Latitude and 69.8 east's Longitude, about *20 km*

Northeast of Bhuj Town of the Kutch district in Western Gujarat. At a depth of only 23 kms below surface this quake generated intense shaking which was felt in 70% region of India and far beyond in neighboring Pakistan and Nepal too. This was followed by intense after shocks that became a continued source of anxiety for the populace.

Que: Analysis the mechanism of measuring the Earthquake.

Que: How it brings destruction at the Epicenter as well as near by located areas.

Que: What is the relationship between the Himalayas and affected centre?

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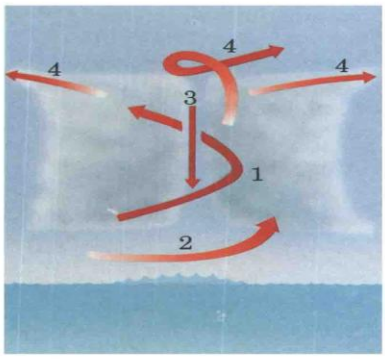
Case Study – 2



Que. Look at the picture carefully and discuss the Atmospheric conditions in the Picture along with detailed explanation the Air masses.

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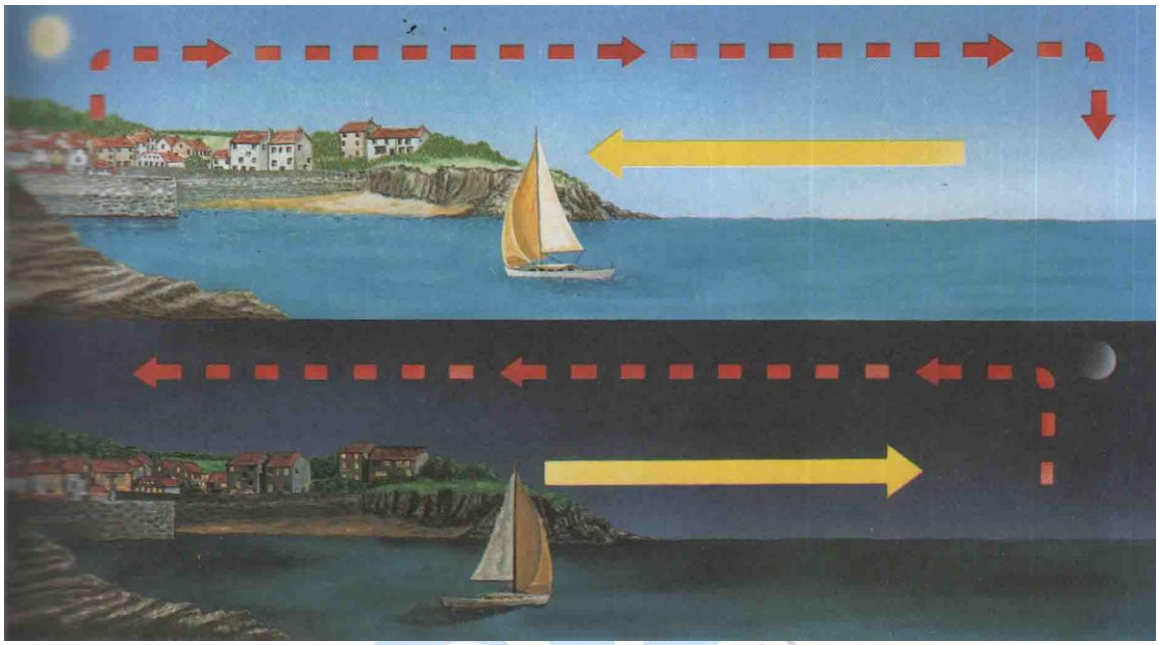
Case Study - 3



Que: during the day, warm air rises over land and cool air blows in from the sea. Why it happens bring a popper explanation along with diagram.

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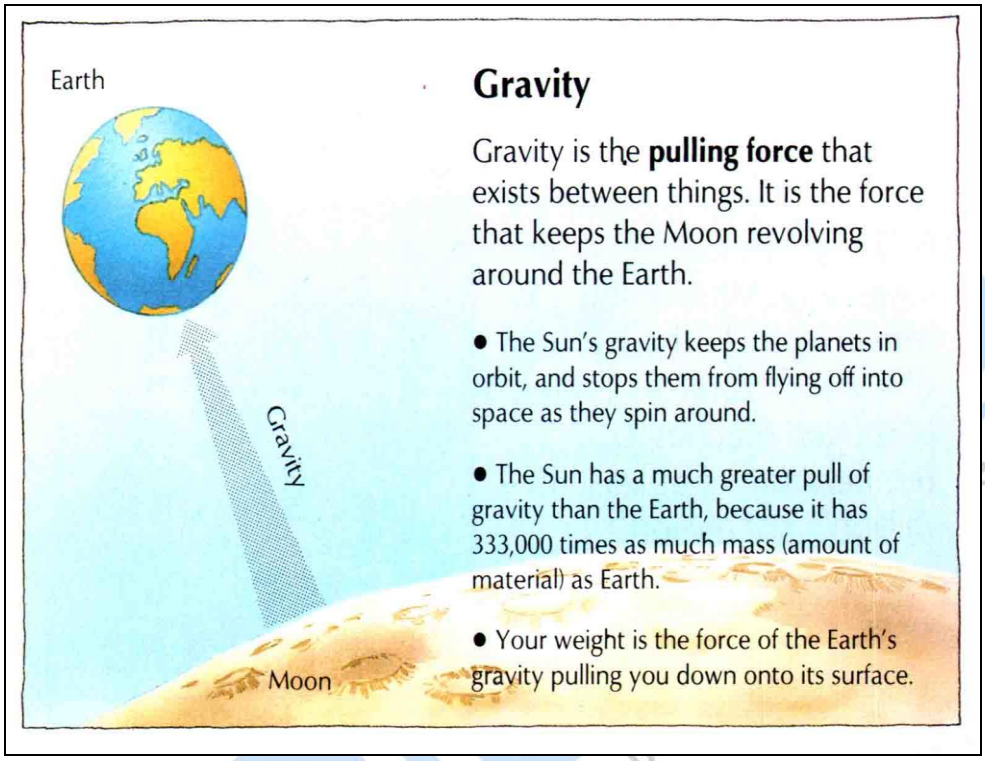
Case Study – 4



Que: Define the Gravitational force and how will you proof that the Gravitational Force is essential over the Earth?

Key Words of Physical Geography

1. **Planet –** A heavenly body that is not a meteor, comet or artificial satellite, which revolute around a star or sun.
2. **Satellite-** A natural or artificial celestial body constrained by Gravitation and moving in Orbit around another more massive heavenly body.
3. **Comet-** A celestial body consisting of a gaseous cloud enveloping a bright nucleus, moving around the sun in an elliptical orbit. When it comes nearer to the sun, the pressure of the sun's Radiation forces the gas of a comet into a tail, pointing away from the sun.
4. **Meteorite-** A solid extra terrestrial body which reaches the earth's surface typically formed of Metals (iron-nickel) or silicates or a combination of both described as stony iron or iron according to composition.
5. **Meteoric dust**- The dust in the atmosphere derived from disintegrating meteors and trapped in the Earth's gravitational field.
6. **Meridian**- Terrestrial, one of the lines of longitude which link the North Pole to the South Pole and cut the equator at right angle.
7. **Latitude**- The angular distance of any point on the Earth's surface worth or South of the Equator, as measured from the Centre of the Earth, in degrees, minutes and seconds.
8. **Lauragia**- The northern part of the great Precambrian land masses, Pangaea.
9. **Pangaea**- The name given by A- Wegener in his theory of continental Drift to a great land mass, the supercontinent of Precambrian times, probably split in two parts, Gondwana lend in the south being separated by a west ocean.
10. **Longitude**- The angular distance between the Meridian passing through a given point and the prime, standard, initial and Zero meridian. This angular distance, i.e. longitude is measured in degrees, minutes and seconds east or west of the Greenwich meridian (0°) to 180°, east and west.

11. **International date line**- An imaginary line agreed internationally which flows the meridian of 180°, with some deviations to accommodate certain land areas. In crossing the line from West to East a whole day is lost.
12. **Galaxy**- One of the great number of systems in the Universe, consisting of stars, nebular and interstellar particles etc. and classified by shape (ellipsoidal, elliptical, spheroid, spherical, spiral). The earth lies in a spiral galaxy, the Milky Way.
13. **Geography**- The study the deals with the material and human phenomena in the space accessible to human beings and their instruments, especially the pattern of, and variation in their distribution in that space, on all scales, in the past or present.
14. **Corrosion**- The wearing a way of rocks by chemical action. This covers a wide variety of processes, including solution, hydration and oxidation.
15. **Coriolis force**- The effect of the force produced by the earth's rotation on a body moving on its surface. The body is deflected to the right of the path of movement in the northern hemisphere, to the left in the southern.
16. **Epeirogenesis**- Pertaining to the formation of continents, applied to the type of mass earth movements which result in charges of level over large areas.
17. **Or genesis**- Tectonic activity and mountain building.
18. **Orbit**- The closed course of a heavenly body, especially the closed path of a planet around the sun.
19. **Eclipse**- The passage of all or part of a celestial body into the shadow of another.
20. **Solar ellipse**- Occurs when the new moon passes exactly between the sun and the earth, casting a shadow on the earth.
21. **Lunar eclipse**- Occurs when the earth passes exactly between the sun and the full moon.
22. **Buy's Ballot's law**- A law postulated by the Dutch metrologies Christophe Buys Ballot in 1857, which states that if an observer in the N-hemisphere stands

23. **Gutenberg Discontinuity**- The discontinui9ty occurring between the lower surface area of the Mantle and the core of the earth.
24. **Geosynclines-** a very large linear depression or syncline or down warping of the Earth]s crust, filled with a deep layer of sediments derived from the land masses on each side and deposited on the floor.
25. **Glacier-** Originally a river of ice moving down a valley.
26. **Geostrophic wind**- The concept of a wind blowing parallel to the isobars as a result of the force exerted by the horizontal atmospheric pressure gradient in one direction a balanced by the deflection of the coriolis force in the opposite direction.
27. **Epicentre**- The point on the Earth's surface immediately above the seismic focus or origin of an earthquake.
28. **Fluvial**- Relating to a river the term fluvial is usually applied to aspects of stream flow and corrosion by the stream.
29. **Barchans**- A crescent shaped sand dune, the leeward slope is relatively steep and windward slope gentle.
30. **Aphelion**- that point farthest from the sun in the orbit of a planet. The earth arrives at aphelion on 4 July, when it is same 152 km distant from the sun.
31. **Perihelion**- the point nearest to the sun in the orbit of comet or planet around it. The earth arrives at its perihelion about 3 January, when it is some 147.3 km from the sun.
32. **Perigee** – The point in the orbit of any of the earth's planets or satellites when it is nearest to the earth.
33. **Paternoster lakes** – lakes in a glaciated valley caused by the damming action of moronic ridges.
34. **Weathering**- In geology the mechanical or physical, chemical and biological processes by which rocks are decomposed or disintegrated by exposure at or near the earth's surface.
35. **Volcano**- A right or vent in the earth's crust through which molten material is erupted and solidifies on the surface as lava.

Climatology

1. **Air mass**- One of the large bodies of air that moves around the world.
2. **Climatologist**- A Scientist who studies climates and how they change over a long time.
3. **Weather**- A general term for the conditions prevailing in the atmosphere, especially in the layer near the ground over a short period of time, at any one place and as affecting human beings.
4. **Climate**- The average weather conditions and variations in these conditions in both space and time over a large area. Weather conditions over a specific length of time, usually a period of at least 30 years are taken into consideration.
5. **Condensation**- When a gas or vapor is changed into a liquid by cooling.
6. **Isobars**- These are lines which are drawn on weather maps. They link together points on the maps which have the same air pressure.
7. **Cyclone-** An area of low air pressure winds spiral in towards its centre.
8. **Barameter**- An instrument used to measure air pressure.
9. **Air Pressure**- The pressure caused by the weight of air above the earth pushing down on its surface. Air pressure is measured in bars or in millibars (1 bar = 1000 millibars)
10. **Anticyclone**- An area of high air pressure. Light winds spiral outwards from its centre.
11. **Chloro fluoro (CFCs)**- Gases used by people in things such as spray cans and refrigerators. They damage the ozone layer.
12. **Evaporation**- What happens when a liquid, such as water, is changed into a gas, by heat.
13. **Natural Gas**- A gas found naturally near underground oil. It is used as a fuel. When natural gas burns it gives out carbon dioxide.
14. **Occluded front**- An occluded front forms when a warm air mass is caught between two cooler air masses and pushed above them.

15. **Ozone**- A pale blue gas with a sharp smell. It is found naturally in the Earth's upper atmosphere. Ozone filters out dangerous ultra violent rays sent out by the sun.
16. **Poles**- The two points (north and south) which mark the end of the line around which the Earth turns.
17. **Sun spot**- A dark patch seen on the surface of the sun. Sunspots last only a few weeks or months, and tend to appears in bursts of activity every eleven years.
18. **Temperature**- The amount of hotness or coldness of something. Temperature is usually measured in degrees Celsius with a thermometer.
19. **Ultraviolet rays**- Invisible rays which occur in sunlight. Ultraviolet rays can cause sunburn in lot clear weather.
20. **Front**- The boundary on the ground between two air masses of different temperatures. Rain and clouds often gather along a front.
21. **Wind**- air in motion usually restricted to natural horizontal movement, varying in strength from light to hurricane.
22. **Westerlies**- Windows which blow frequently from the subtropical high pressure area to the temperature low pressure area, between 35°N and 65°S & 65°S.
23. **Typhoon**- A violent tropical Revolving storm in the China Sea and adjacent regions, commonly occurring in the period from July to October.
24. **Tropopause**- A zone of the atmosphere consisting of several, over lapping levels, separating the Troposphere from the stratosphere.
25. **Thermometer**- An instrument used to measured temperature on any temperature scale.

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Oceanography

1. **Ocean**- The body of salt water which covers 70.78% of the Earth's surface.
2. **Ocean Crust**- That part of the crust of the earth which lies under the floor of the Ocean Basins.
3. **Monsoon**- A large scale seasonal reversal of winds pressure and rainfall in the tropics.
4. **Wave**- in a body of water, particularly in the Ocean, the rise and fall in the forward movement in the surface area of the water, due to the oscillation of water particles.
5. **Current**- The permanent of seasonal flow of water in a defined direction in the surface water of an Ocean, e.g. the North Atlantic Drift, Labrador Current.
6. **Continental Shelf**- the gently sloping part of a continent that lies submerged below the sea.
7. **Continental Slope**- The marked slope, commonly with an angle between 2° & 5°, lying between the edge of the continental shelf and the deep Ocean floor.
8. **Cliff**- A very steep or vertical rock face.
9. **Base level**- The lowest level to which a running stream can crude its bed under stable conditions of the earth's crust.
10. **Atoll**- A circular of horse shoe shaped coral reef, the crust lying at a low height above sea level.
11. **Abyssal Zone**- The deepest regions of the Ocean, depth not precisely defined.
12. **Geyser**- A periodic jet of hot water and stream that is ejected under pressure from a vent in the earth's crust.
13. **Tombolo**- A bar connecting two head lands and islands is called tombola, which acts as a bridge between the coast and an island.
14. **Hooks**- The spits when bent by powerful sea waves, assume the shape of a hook.

15. **Beaches**- Temporary or short lived deposits of marine sediments consisting of sands, shingles, cobbles, pebbles etc. on the sea shores are called beaches.
16. **Streams**- Ocean streams involve moments of enormous volume of Ocean water like big rivers of the continents in a definite direction with greater velocity.
17. **Corals**- The living organisms of the category of marine animals and related to jelly fish, which are responsible for building coral reefs, are called corals.
18. **Faros**- Faros are chains of small atolls having shallow small lagoons.
19. **Boat Channel**- The lagoon formed between the fringing reef and the lend is called boat channel which is long but narrow in width.
20. **Mari culture**- Mari culture, also known as marine farming or marine culture.
21. **Centrifugal force**- Is the force that works outward on a body rotating absent an axis.
22. **Tides**- The rise and fall of sea level caused by the gravitational attractions of the moon and the sun are called tides.
23. **Ebb**- The fall of sea water and its movement away from the coast, i.e. toward the sea, is called ebb.
24. **Neap tide**- the tide which has lower tidal range than the normal tidal range is called neap tide.
25. **Quadrature**- The position of the sun, the earth and the moon in right angle is called quadrature.

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B.A./B.Sc. (Part I) Examination, 2009
(Three Year Scheme of 10+2+3 Pattern)
(Common for the faculties of Science and Arts)
[Also Common with subsidiary Paper of B.Sc. (Hons.) Part-I]

Geography
First Paper (Physical Geography)

Time: 3 hours *M.M. : 75 for Arts*
50 for Science

Unit- I

1. Show the following on the outline map of the world supplied to you:
   (a) Kunlun Mountain
   (b) Irawadi River
   (c) Black Sea
   (d) Kalahari Desert
   (e) Great Barrier Reef.

2. Write correct answers of the following in your answers book:
   (i) Continental drift theory was given by:
   (a) Wegner
   (b) Holmes
   (c) Kant
   (d) Daly

2. Granite is a:
   (a) Igneous Rock
   (b) Sedimentary Rock
   (c) Metamorphic Rock
   (d) Glacial Rock

3. `"Gorge" topography is related with:
   (a) Glacier
   (b) Underground Water
   (c) Wind
   (d) Running water

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4. Convection current theory of mountain building was given by:
   (a) Hall
   (b) Haug
   (c) Holmes
   (d) Kober

5. Fujiyama volcano is:
   (a) Dormant volcano
   (b) Active volcano
   (c) Extinct volcano
   (d) None of these

Section A

2. Describe the plate tectonic theory:
3. Give comparison of Davis and Penk's views of "cyle of erosion".
4. Write short notes on:
   (a) Weathering and its types
   (b) Topography of wind.

Section-B

5. Give a detailed account of composition and structure of Atmosphere.
6. Give an account of planetary winds of world.
7. What is cyclone? Discuss the origin of temperate cyclones.
8. Describe the relief features of Atlantic Ocean.
9. What are coral reefs? Discuss Darwin theory of coral reef formation.
10. Write short notes on any two of the following:
    (i) Inversion of Temperature
    (ii) Geological time scale
    (iii) Ocean deposits
    (iv) Current of Pacific Ocean

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B.A./B.Sc. (Part I) Examination, 2008
(Three Year Scheme of 10+2+3 Pattern)
(Common for the faculties of Science and Arts)
[Also Common with subsidiary Paper of B.Sc. (Hons.) Part-I]
Geography
First Paper (Physical Geography)

Time: 3 hours *M.M. : 75 for Arts*

50 for Science

Unit- I

1. Show the following on the outline map of the world supplied to you:
   (a) Hindu Kush Mountains
   (b) Hwangho River
   (c) Mediterranean Sea
   (d) Sahara Desert
   (e) Iceland Island

2. Write correct answer of the following in your answers book:
   (a) The feature related to glacier is:
   (i) Yardangs
   (ii) Cirque
   (iii) Lapies
   (iv) Gorge
   (ii) The Convection Current theory was performed by:
   (a) James Jeans
   (b) Hayford
   (c) Holmes
   (d) Wegner

(iii) Ozonosphere is related to:
   (a) Moon
   (b) Jupiter
   (c) Venus
   (d) Sun

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(iv) Gabro is a:
(a) Igneous Rock
(b) Sedimentary Rock
(c) Metamorphic Rock
(d) Eoess Rock

3. Differentiate any three of the following:
(i) Asteroid and Satellite
(ii) Gutenberg and Moho Discontinuity
(iii) 'U' and 'V' shaped valley
(iv) Land and Sea Breeze
(v) Warm and Cold front

Section 'A'

2. Define isostasy and discuss origin and evaluation of theory of isotasy.
3. Explain physical and chemical composition of interior of the earth.
4. Describe the landform formed by underground water.

Section 'B'

5. What do you mean by precipitation? Explain the world distribution pattern of rainfall.
6. What are airmases? Give a detail account of European airmasses.
7. Describe the scheme of climatic classification as given by Koppen.

Section 'C'

8. Give a detailed account of Indian Ocean floor.
9. How do "Tides originate"? Describe various types of tides.
10. Write short note son any two
(i) Types of folds
(ii) Classification of waterfalls
(iii) Anticyclones
(iv) Atoll

B.A./B.Sc. (Part I) Examination, 2007
(Three Year Scheme of 10+2+3 Pattern)
(Common for the faculties of Science and Arts)
[Also Common with subsidiary Paper of B.Sc. (Hons.) Part-I]
Geography
First Paper (Physical Geography)

Time: 3 hours *M.M. : 75 for Arts*

50 for Science

Unit- I

1. Show the following on the outline map of the world supplied to you:
- (a) Karakoram Mountain
- (b) Lake Baikal
- (c) Nile River
- (d) Cape of Good Hope

2. Answer the following in you answer book:
- (a) Which is the biggest planet?
  - (i) Saturn
  - (ii) Jupiter
  - (iii) Uranus
  - (iv) Plato
- (b) 'Pot holes' are formed by:
  - (i) Wind
  - (ii) Glacier
  - (iii) Rivers
  - (iv) Waves
- (c) Binary Star theory relates to:
  - (i) Kandt
  - (ii) Otto Schmidt
  - (iii) Laplace
  - (iv) James Jeans
- (d) Which is not an igneous rock?
  - (i) Granite
  - (ii) Grabo
  - (iii) Batholith
  - (iv) Limestone

3. Differentiate the following (any three) :

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(i) Cyelones and Anticyclones
(ii) Stack and Bar
(iii) Stalactite and Stalagmite
(iv) Weathering and Erosion

Section-A

2. Explain the Geosynclinals theory of mountain building.
3. What are volcanoes? Which are the landforms associated with volcanie activity? Show the volcanic betts in the world.
4. Describe the landforms formed by glaciers.

Section-B

5. What is isolation? Discuss the factors that affect the insulation.
6. Show the global pattern of air pressure. How do the pressure belts shift and break.
7. Describe origin, characteristics, path and weather to temperate cyclones in the Northern Hemisphere.

Section-C

8. Discuss the effect of the factors that control the distribution of salinity of oceanic water.
9. Describe the currents of Atlantic Ocean.
10. Write short notes on any two:
    (i) Types of tides
    (ii) Oceans-future storehouse
    (iii) Plate tectonics
    (iv) Inversion of temperature

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