

DIRECTORATE OF EDUCATION
Govt. of NCT, Delhi

SUPPORT MATERIAL
(2022-2023)

GEOGRAPHY

Class : XI

Under the Guidance of

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IAS**



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Message

Remembering the words of John Dewey, "Education is not preparation for life, education is life itself", I highly commend the sincere efforts of the officials and subject experts from Directorate of Education involved in the development of Support Material for classes IX to XII for the session 2022-23.

The Support Material is a comprehensive, yet concise learning support tool to strengthen the subject competencies of the students. I am sure that this will help our students in performing to the best of their abilities.

I am sure that the Heads of Schools and teachers will motivate the students to utilise this material and the students will make optimum use of this Support Material to enrich themselves.

I would like to congratulate the team of the Examination Branch along with all the Subject Experts for their incessant and diligent efforts in making this material so useful for students.

I extend my Best Wishes to all the students for success in their future endeavours.

(Ashok Kumar)

HIMANSHU GUPTA, IAS
Director, Education & Sports



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MESSAGE

“A good education is a foundation for a better future.”

- Elizabeth Warren

Believing in this quote, Directorate of Education, GNCT of Delhi tries to fulfill its objective of providing quality education to all its students.

Keeping this aim in mind, every year support material is developed for the students of classes IX to XII. Our expert faculty members undertake the responsibility to review and update the Support Material incorporating the latest changes made by CBSE. This helps the students become familiar with the new approaches and methods, enabling them to become good at problem solving and critical thinking. This year too, I am positive that it will help our students to excel in academics.

The support material is the outcome of persistent and sincere efforts of our dedicated team of subject experts from the Directorate of Education. This Support Material has been especially prepared for the students. I believe its thoughtful and intelligent use will definitely lead to learning enhancement.

Lastly, I would like to applaud the entire team for their valuable contribution in making this Support Material so beneficial and practical for our students.

Best wishes to all the students for a bright future.

(HIMANSHU GUPTA)

Dr. RITA SHARMA
Additional Director of Education
(School/Exam)



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संदेश

शिक्षा निदेशालय, दिल्ली सरकार का महत्वपूर्ण लक्ष्य अपने विद्यार्थियों का सर्वांगीण विकास करना है। इस उद्देश्य को ध्यान में रखते हुए शिक्षा निदेशालय ने अपने विद्यार्थियों को उच्च कोटि के शैक्षणिक मानकों के अनुरूप विद्यार्थियों के स्तरानुकूल सहायक सामग्री उपलब्ध कराने का प्रयास किया है। कोरोना काल के कठिनतम समय में भी शिक्षण अधिगम की प्रक्रिया को निर्बाध रूप से संचालित करने के लिए संबंधित समस्त अकादमिक समूहों और क्रियान्वित करने वाले शिक्षकों को हार्दिक बधाई देती हूँ।

प्रत्येक वर्ष की भाँति इस वर्ष भी कक्षा 9वीं से कक्षा 12वीं तक की सहायक सामग्रियों में सी.बी.एस.ई. के नवीनतम दिशा-निर्देशों के अनुसार पाठ्यक्रम में आवश्यक संशोधन किए गए हैं। साथ ही साथ मूल्यांकन से संबंधित आवश्यक निर्देश भी दिए गए हैं। इन सहायक सामग्रियों में कठिन से कठिन पाठ्य सामग्री को भी सरलतम रूप में प्रस्तुत किया गया है ताकि शिक्षा निदेशालय के विद्यार्थियों को इसका भरपूर लाभ मिल सके।

मुझे आशा है कि इन सहायक सामग्रियों के गहन और निरंतर अध्ययन के फलस्वरूप विद्यार्थियों में गुणात्मक शैक्षणिक संवर्धन का विस्तार उनके प्रदर्शन में भी परिलक्षित होगा। इस उत्कृष्ट सहायक सामग्री को तैयार करने में शामिल सभी अधिकारियों तथा शिक्षकों को हार्दिक बधाई देती हूँ तथा सभी विद्यार्थियों को उनके उज्वल भविष्य की शुभकामनाएं देती हूँ।

रीता शर्मा

(रीता शर्मा)

भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक ¹[संपूर्ण प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य] बनाने के लिए, तथा उसके समस्त नागरिकों को :

सामाजिक, आर्थिक और राजनैतिक न्याय,
विचार, अभिव्यक्ति, विश्वास, धर्म
और उपासना की स्वतंत्रता,
प्रतिष्ठा और अवसर की समता
प्राप्त कराने के लिए,

तथा उन सब में

व्यक्ति की गरिमा और ²[राष्ट्र की एकता

और अखंडता] सुनिश्चित करने वाली बंधुता

बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख
26 नवंबर, 1949 ई. को एतद्वारा इस संविधान को
अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) "प्रभुत्व संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ²[unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)

भारत का संविधान

भाग 4क

नागरिकों के मूल कर्तव्य

अनुच्छेद 51 क

मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- (क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;
- (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;
- (ग) भारत की संप्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण बनाए रखे;
- (घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;
- (ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभावों से परे हो, ऐसी प्रथाओं का त्याग करे जो महिलाओं के सम्मान के विरुद्ध हों;
- (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परिरक्षण करे;
- (छ) प्राकृतिक पर्यावरण की, जिसके अंतर्गत वन, झील, नदी और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;
- (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;
- (झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;
- (ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे, जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई ऊँचाइयों को छू सके; और
- (ट) यदि माता-पिता या संरक्षक हैं, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य को शिक्षा के अवसर प्रदान करे।



Constitution of India

Part IV A (Article 51 A)

Fundamental Duties

It shall be the duty of every citizen of India —

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;
- * (k) who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

Note: The Article 51A containing Fundamental Duties was inserted by the Constitution (42nd Amendment) Act, 1976 (with effect from 3 January 1977).

* (k) was inserted by the Constitution (86th Amendment) Act, 2002 (with effect from 1 April 2010).

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Govt. of NCT, Delhi

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(2022-2023)

GEOGRAPHY
Class : XI

NOT FOR SALE

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DIRECTORATE OF EDUCATION GNCT OF DELHI
SUPPORT MATERIAL 2022-23
CLASS - XI
SUBJECT: GEOGRAPHY
Reviewed by

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COURSE STRUCTURE CLASS XI (2022-23)

One Theory Paper

70Marks
3Hours

Part	Units	No. of Periods	Marks
A	Fundamentals of Physical Geography	89	35 Marks
	Unit-1: Geography as a discipline	06	30
	Unit-2: The Earth	11	
	Unit-3: Landforms	20	
	Unit-4: Climate	30	
	Unit-5: Water (Oceans)	10	
	Unit-6: Life on the Earth	07	
	Map and diagram	05	5
B	India-Physical Environment	78	35 Marks
	Unit-7: Introduction	04	30
	Unit-8: Physiography	28	
	Unit-9: Climate, vegetation and soil	28	
	Unit-10: Natural hazards and disasters	14	
	Map and Diagram	04	5
	Total	167	70 Marks
C	Practical Work in Geography Part I	50	30 Marks
	Unit-1: Fundamentals of Maps	20	10 Marks
	Unit-2: Topographic and Weather Maps	30	15 Marks
	Practical Record Book and Viva		5 Marks

COURSE CONTENT

Part A:	Fundamentals of Physical Geography	89 Periods
Unit 1:	Geography as a Discipline <ul style="list-style-type: none"> ▫ Geography as an integrating discipline, as a science of spatial attributes ▫ Branches of Geography: Physical Geography and Human Geography ▫ Scope and Career Options (Non-evaluative) 	06 Periods
Unit 2:	The Earth Origin and evolution of the earth; interior of the earth Wegener's continental drift theory and plate tectonics Earthquakes and volcanoes: causes, types and effects	11 Periods
Unit 3:	Landforms <ul style="list-style-type: none"> ▫ Rocks: major types of rocks and their characteristics ▫ Geomorphic processes: weathering; mass wasting; erosion and deposition; soil-formation ▫ Landforms and their evolution- Brief erosional and depositional features 	20 Periods
Unit 4:	Climate <ul style="list-style-type: none"> ▫ Atmosphere- composition and structure; elements of weather and climate ▫ Insolation-angle of incidence and distribution; heat budget of the earth-heating and cooling of atmosphere (conduction, convection, terrestrial radiation and advection); temperature- factors controlling temperature; distribution of temperature-horizontal and vertical; inversion of temperature ▫ Pressure-pressure belts; winds-planetary, seasonal and local; air masses and fronts; tropical and extra tropical cyclones 	30 Periods

	<ul style="list-style-type: none"> ▫ Precipitation–evaporation; condensation–dew, frost, fog, mist and cloud; rainfall–types and world distribution ▫ Climate and Global Concerns 	
Unit 5:	Water (Oceans) <ul style="list-style-type: none"> ▫ Basics of Oceanography ▫ Oceans - distribution of temperature and salinity ▫ Movements of ocean water–waves, tides and currents; submarine reliefs ▫ Ocean resources and pollution 	10 Periods
Unit 6:	Life on the Earth <ul style="list-style-type: none"> ▫ Biosphere - importance of plants and other organisms; biodiversity and conservation; ecosystem and ecological balance 	07 Periods
Map work on identification of features based on 1 to 6 units on the outline Physical/Political map of the world.		05 Periods
Part B:	India-Physical Environment	78 Periods
Unit 7:	Introduction <ul style="list-style-type: none"> ▫ Location, space relations, India's place in the world 	04 Periods
Unit 8:	Physiography <ul style="list-style-type: none"> ▫ Structure and Relief; Physiographic Divisions ▫ Drainage systems: Concept of river basins, watershed; the Himalayan and the Peninsular rivers 	28 Periods
Unit 9:	Climate, Vegetation and Soil <ul style="list-style-type: none"> ▫ Weather and climate - spatial and temporal distribution of temperature, pressure winds and rainfall, Indian monsoon: mechanism, onset and withdrawal, variability of rainfalls: spatial and temporal; use of weather charts ▫ Natural vegetation–forest types and distribution; wild life; conservation; biosphere reserves ▫ Soils - major types (ICAR's classification) and their distribution, soil degradation and conservation 	28 Periods
Unit 10:	Hazards and Disasters: Causes, Consequences and Management <ul style="list-style-type: none"> ▫ Floods, Cloudbursts 	14 Periods

	<ul style="list-style-type: none"> ▫ Droughts: types and impact ▫ Earthquakes and Tsunami ▫ Cyclones: features and impact ▫ Landslides 	
Map Work of features based on above units for locating and labeling on the outline Political/Physical map of India		04 Periods
Part C:	Practical Work in Geography Part I	50 Periods
Unit 1:	Fundamentals of Maps <ul style="list-style-type: none"> ▫ Geo spatial data, Concept of Geographical data matrix; Point, line, area data ▫ Maps -types; scales-types; construction of simple linear scale, measuring distance; finding direction and use of symbols ▫ Map projection- Latitude, longitude and time, typology, construction and properties of projection: Conical with one standard parallel and Mercator's projection. (only two projections) 	20 Periods
Unit 2:	Topographic and Weather Maps <ul style="list-style-type: none"> ▫ Study of topographic maps (1 : 50,000 or 1 : 25,000 Survey of India maps); contour cross section and identification of landforms-slopes, hills, valleys, waterfall, cliffs; distribution of settlements ▫ Aerial Photographs: Types and Geometry-vertical aerial photographs; difference between maps and aerial photographs; photo scale determination. Identification of physical and cultural features ▫ Satellite imageries, stages in remote sensing data-acquisition, platform and sensors and data products, (photographic and digital) ▫ Use of weather instruments: thermometer, wet and dry-bulb thermometer, barometer, wind vane, rain gauge 	30 Periods
Practical Record Book and Viva Voce Viva to be based on Practical Unit I and II only.		

Content

<i>S.No.</i>	<i>Chapter Name</i>	<i>Page No.</i>
Unit I : Geography as a Discipline		
1.	Geography as a Discipline	
Unit II : The Earth		
2.	The Origin and Evolution of the Earth	
3.	Interior of the Earth	
4.	Distribution of Oceans and Continents	
Unit III : Land forms		
5.	Minerals and Rocks	
6.	Geomorphic Processes	
7.	Landforms and their Evolution	
Unit IV : Climate		
8.	Composition and Structure of Atmosphere	
9.	Solar Radiation, Heat Balance and Temperature	
10.	Atmospheric Circulation and Weather Systems	
11.	Water in the Atmosphere	
12.	World Climate and Climate Change	
Unit V : Water (Oceans)		
13.	Water (Oceans)	
14.	Movements of Ocean Water	
Unit VI : Life on the Earth		
15.	Life on the Earth	
16.	Biodiversity and Conservation	

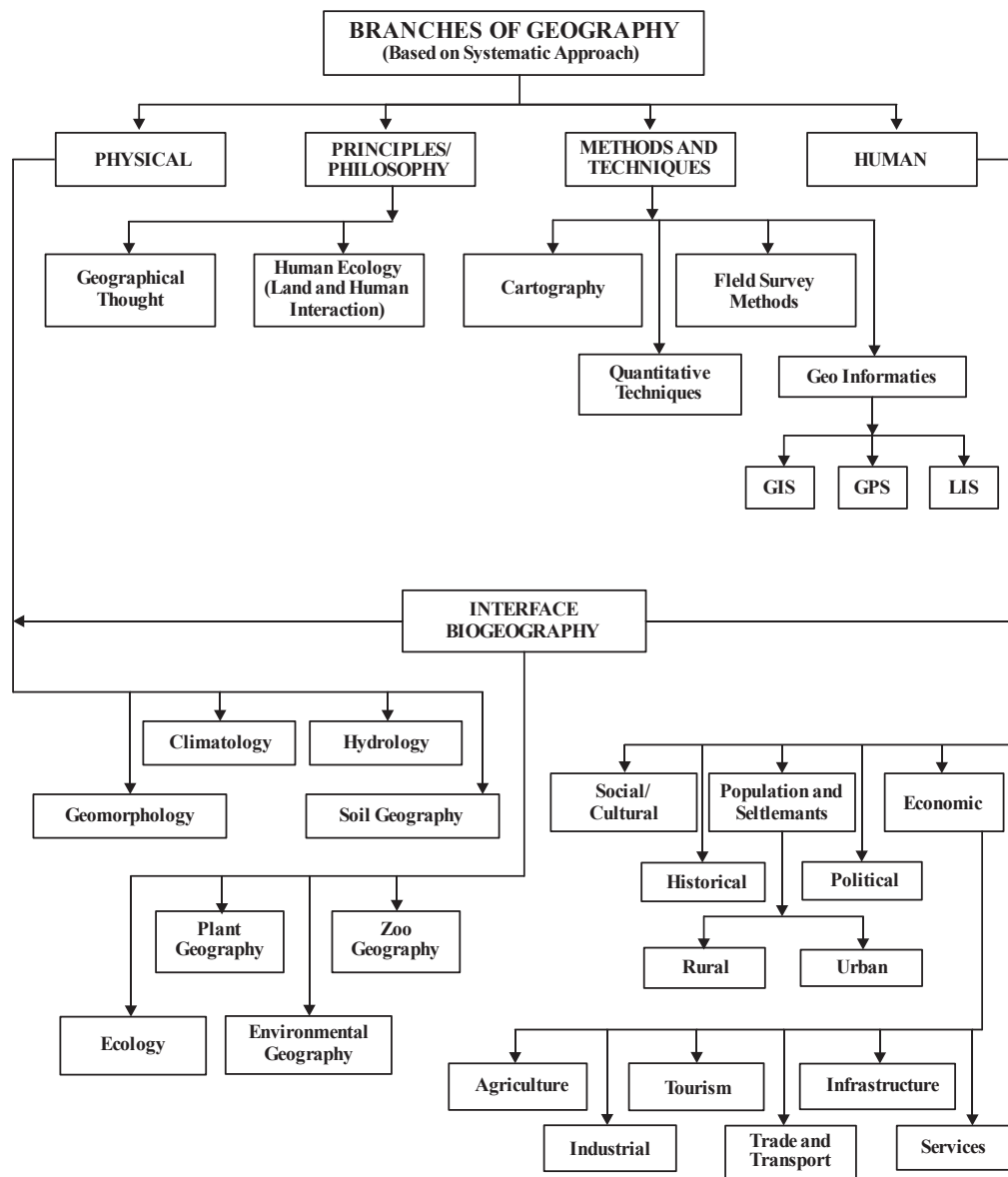
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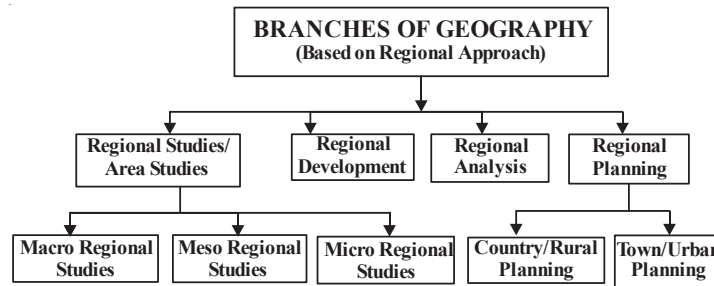
<i>S.No.</i>	<i>Chapter Name</i>	<i>Page No.</i>
Unit I: Introduction		
1.	India — Location	
Unit II: Physiography		
2.	Structure and Physiography	
3.	Drainage System	
Unit III: Climate, Vegetation and Soil		
4.	Climate	
5.	Natural Vegetation	
6.	Soils	
Unit IV: Natural Hazards and Disasters: Causes, Consequences and Management		
7.	Natural Hazards and Disasters	

• **Important Maps**

Lesson – 1

Geography As A Discipline





Multiple-Choice Questions

Q.1. Which of the following is not studied under economic geography?

- (a) Agriculture (b) Industry
(c) Transport (d) Population

Ans. (d) Population

Q.2. Under which approach is the world divided into regions at different hierarchical levels and then all the geographical phenomena in a particular region are studied.

- (a) Systematic Approach (b) Physical Approach
(c) Dualism Approach (d) Regional Approach

Ans. (d) Regional Approach

Q.3. Make correct pairs from the following two columns and mark the correct option.

1. Meteorology	A. Population Geography
2. Demography	B. Soil Geography
3. Sociology	C. Climatology
4. Pedology	D. Social Geography

- (a) 1B, 2C, 3A, 4D (b) 1A,2D,3B,4C
(c) 1D, 2B, 3C ,4A (d) 1C, 2A, 3D, 4B

Ans. (d) 1(C), 2(A), 3(D), 4(B)

4. What do we study under physical geography?

- (a) Weather (b) Soil
(c) Atmosphere (d) All of the above

Ans. (d) All of the above

5. _____ field of geography is concerned about the study of spatial aspect of production, distribution, exchange and consumption.

- (a) Economic Geography (b) Demography
(c) Political Geography (d) Historical Geography

Ans. (a) Economic Geography

6. Consider the following statements:

Assertion: Technology has improved our understanding of nature.

Reasoning : Technology has provided better chances of monitoring natural phenomena as well as the economic and social parameter.

Choose the correct option:

- a. Only A is correct
b. Both A and R are correct and R explains A
c. Only R is correct
d. Both are incorrect

Ans. (b) Both A and R are correct and R explains A

7. The major issue for environmental geography is-

- (a) Scientific study of Habitats
- (b) pollution, land degradation and conservation of environment
- (c) geographic characteristics of animals and their habitats
- (d) population explosion

Ans. (b) pollution, land degradation and conservation of environment

MCQ

8. Which of the following statement is true with respect to systematic geography:

- (a) This approach was given by Karl Ritter
- (b) In this approach phenomena is studied world over.
- (c) In this approach all aspects of a region are studied
- (d) It studies about soil, climate and population of a country.

Ans. (b)

9. Art and science of making map is called as:

- (A) GIS
- (B) Field survey
- (C) Cartography
- (D) Topography

Ans. (C)

10. _____ is the study of landforms, their evolution and related processes.

- (A) Climatology
- (B) Hydrology
- (C) Zoology
- (D) Geomorphology

Ans. D

Short/Long Questions

Q.1. Geography as a scientific discipline is concerned with how many categories of questions. Explain.

OR

On what basis can we say that geography is a scientific subject?

Ans. Geography as a discipline is concerned with three sets of questions:

1. **What?** Some questions are concerned with the identification of the patterns of natural and cultural features as found over the surface of the earth. These are the questions about "what"?
2. **Where?** Second type of questions is related to the distribution of the natural and human/ cultural features over the surface of the earth. These are the questions about where?
3. **Why ?** The third question is related to the explanation or the causal relationships between features and the processes and phenomena.

Q.2. Explain different branches of Physical geography.

Ans. It has four sub-branches which are as follows:

- **Geomorphology:** It is concerned with the study of landforms, their evolution and related processes.
- **Climatology:** It is concerned with the study of structure of atmosphere and elements of weather and climates and climatic types and regions.
- **Hydrology:** It studies the realm of water over the surface of the

earth including oceans, lakes, rivers and other water bodies and its effect on different life forms including human life and their activities.

- **Soil Geography:** It is concerned with the study of the processes of soil formation, soil types, their fertility status, distribution and use.

Q.3. What matters are studied under Human Geography?

Ans. Following facts are studied under Human Geography:

- **Social/Cultural Geography:** It is concerned with the study of society and its spatial dynamics as well as the cultural elements contributed by the society.
- **Population Geography:** It studies population growth, distribution, density, sex ratio, migration and occupational structure, etc.
- **Settlement Geography:** It studies the characteristics of rural and urban settlements.
- **Economic Geography:** It studies economic activities of the 'people including agriculture, industry, tourism, trade, and transport, infrastructure and services, etc.
- **Historical Geography:** It studies the historical processes through which the space gets organized. In other words, it studies how history has influenced the geography of a region.
- **Political Geography:** It studies the impact of political events and studies boundaries, space relations between neighboring political units, delimitation of constituencies, election scenario and develops theoretical framework to understand the political behavior of the population.

Q.4. Geography is an integrated discipline. How?

Ans.

- It is a discipline of synthesis: it includes spatial and temporal synthesis. Its approach is holistic in nature.
- The present world is a global village. The efficient transport and communication helped the world to become unified village. The audiovisual media helped the data to be enriched.
- Technology provided better chances for monitoring natural phenomena as well as the economic and social parameters.

Q.5. Highlight is the importance of Physical Geography?

Ans. Physical geography includes study of Lithosphere, Atmosphere, Hydrosphere and Biosphere. Each element is very important for human beings..

- The study of physical geography is emerging as a discipline of evaluating and managing natural resources. In order to achieve this objective, it is essential to understand the intricate relationship between physical environment and human beings.
- Physical environment provides resources, and human beings utilize these resources and ensure their economic and cultural development.
- Accelerated pace of resource utilization with the help of modern technology has created ecological imbalance in the world. Therefore, a better understanding of physical environment is essential in study of Geography.

Q.6. Physical and human factors, both are dynamic not static. Explain.

Or

Evaluate the interrelationship of man and nature in three points.

Ans. The geographical phenomena, both the physical and human, are not static but highly dynamic. They change over times as a result of the interactive processes between ever changing earth and untiring and ever-active human beings.

1. Primitive human societies were directly dependent on their immediate environment. Human beings have come to terms with nature through adaptation and modification.
2. Present societies have modified their natural environment by inventing and using technology and thus, have expanded the horizon of their operation by appropriate utilization of the resources provided by nature.
3. With the gradual development of technology, human beings were able to loosen the shackles of their physical environment. Technology helped in reducing the harshness of labour, increased labour efficiency and provided leisure to human beings to attend to the higher needs of life.

Q.7. Geography plays an important role for a country. How?

Ans. Geography is important for a country because:

- Geography studies the variations and association of the features on the earth surface e.g. cropping pattern differs from place to place and it is due to difference in the climate, soil, demand, transport facility and capacity of the farmer.
- Geography also studies the cause and effect relationships.
- The interaction between man and nature is highly dynamic and not static; so it is also called as the study of the relation between unstable earth and unresting man.

- It helps to predict climate.
- It helps in handling natural calamities.
- It provides a visual look of earth through GIS, Computer cartography, and Remote sensing.

Q.8. Differentiate between Systematic approach and Regional approach.

Ans. Main differences between systematic and regional approach are summarized below:

Systematic Approach	Regional Approach
<ol style="list-style-type: none"> 1. The systematic geography approach was introduced by Alexander Von Humboldt, a German geographer. 2. In systematic approach, a phenomenon is studied world over as a whole, and then the identification of typologies or spatial patterns is done. 3. For example, If we study the wildlife we will study wildlife in the whole world. 	<p>Regional geography approach was developed by another German geographer and a contemporary of Humboldt, Karl Ritter.</p> <p>In the regional approach, the world is divided into regions at different hierarchical levels and then all the geographical phenomena in a particular region are studied. These regions may be natural, political or designated.</p> <p>For example, life in Kerela, we study about population, area, wildlife climate etc. in detail about Kerala.</p>

Q.9. Differentiate between Physical geography and Biogeography.

Ans. The main differences between Physical geography and Biogeography are given below:

Physical Geography	Biogeography
1. It has developed as a subject concerned with study of evaluation and management of natural resources.	It has emerged as a result of the interface between physical geography and human geography.
2. It has many branches: Geomorphology. climatology and hydrology & soil geography	It has many branches: Plant Geography. Zoo Geography and Ecology & environment geography
3. It studies abiotic elements of the earth.	It studies biotic elements of the earth.

Q.10. How geography is concerned with other social sciences? Explain with suitable examples.

Ans. The main branch of geography, human geography, is closely linked with all the social science disciplines viz. History, economics, political science, sociology, demography etc. which is as follows-

- (1) History is linked with geography as the subject areas of both the subjects are connected with space and time.
- (2) The core concern of political science is territory, people and sovereignty while political geography is also interested in the study of the state as a spatial unit.
- (3) Economics deals with basic attributes of economy which has spatial aspects and hence connected with economic geography.

The above discussion shows that geography has strong interface with natural and social sciences.

Long Questions

11. "History of a place is influenced by its geography". Elaborate the statement with suitable examples.

Ans. Geography of a place influences history of that area to a extend.
For e.g

1. Himalayas has acted as a barrier and protection for India for a long time but passes provided route to the invaders.
2. Long coastline encouraged European to find sea routes and make settlements or trade towns in coastal locations.
3. Areas surrounded by mountains or water bodies provide natural protection in case of attack or war.

12. "Physical geography is more close to natural sciences." Comment.

Ans. Yes, this is true that physical geography is closer to natural sciences as it shares its content with physics, biology, chemistry, botany, maths etc. For example:

1. Geographer use knowledge of maths for various calculations and data interpretation.
2. The cartography and quantitative techniques require proficiency in mathematics.
3. To understand basic physical laws of climate knowledge of physics is needed.
4. Geomorphology derives it's base from geology.
5. Bio geography as much in common with botany, zoology etc.

Lesson – 2

Origin And Evolution Of The Earth

Multiple-Choice Questions

Q.1. Why are the terrestrial planets rocky?

- (a) These planets are smaller
- (b) They could not hold the escaping gases
- (c) Both a and b
- (d) None of these

Ans. (c) Both a and b

Q.2. Which expert gave the nebular hypothesis?

- (a) Immanuel Kant
- (b) Laplace
- (c) Chamberlain
- (d) Moulton.

Ans. (b) Laplace

Q.3. Which theory is most widely accepted regarding origin of the universe at present?

- (a) Collision hypothesis
- (b) Big Bang Theory
- (c) Nebular hypothesis
- (d) Binary Theory.

Ans. (b) Big Bang Theory

Q.4. Make correct pairs from the following two columns and mark the correct option.

- | | |
|--|---------------------------------------|
| 1. The small rocky particles found between the orbits of mars and Jupiter. | A. A very large cloud of hydrogen gas |
| 2. Nebula | B. Gas Giant planet |
| 3. Mercury | C. Asteroids |
| 4. Saturn | D. Inner planet |

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

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

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

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

Ans. (d) 1C, 2A, 3D, 4B

Q.5. Which of the following is not an inner planet?

- | | |
|-------------|-------------|
| (a) Jupiter | (b) Mercury |
| (c) Venus | (d) Earth. |

Ans. (a) Jupiter

Q.6. Expansion of universe means

- (a) Increase in the number of stars
- (b) Increase in space between the galaxies
- (e) Discovery of new celestial bodies
- (d) Increase in the speed of rotation of planets

Ans. (b) Increase in space between the galaxies

Q.7. By which elements is the terrestrial planets formed?

- (a) Rocks and Metals (b) Hydrogen and helium
(c) Liquid elements (d) All of the above.

Ans. (a) Rocks and metals.

Q.8. Arrange the following in the correct order from early to later in origin:

1. Origin of First fish 2. Origin of Blue Green algae
3. Dominance of reptile 4. Appearance of early humans
(a) 1-2-3-4 (b) 2-3-1-4
(c) 2-1-3-4 (d) 4-3-2-1

Ans. (C)

Q.9. Which of the following is not true with regard to big bang theory?

- (A) There was a tiny ball of mass with infinite temperature
(B) There was a violent explosion of tiny ball
(C) Universe got shrinked after explosion
(D) Within three minutes of explosion first atom was formed.

Ans. (C)

Q.10. _____ process led to the addition of oxygen in the earth's atmosphere.

- A. process of Differentiation B. Process of degassing
C. Photosynthesis D. Volcanic eruptions

Ans. C

Short answers questions

Q.1. What do you mean by light year?

Ans. A light year is equal to the number of kilometers travelled by light per second. It is a measure of distance and not of time. Light travels at a speed of 300,000 km/second. Therefore, the distances the light will travel in one year is taken to be one light year.

Q.2. How did atmosphere originate?

Ans. Gases were released from the earth's interior such as water vapour and other gases. There were water vapor, nitrogen, carbon dioxide, methane, ammonia and little free oxygen. The process of outpouring the gases from the interior of the earth is called degassing. The process of differentiation created the present atmosphere.

Q.3. Before 2006 solar system consisted of 9 planets. But today we have only 8 planets. Why?

Ans. Till recently i.e. 2006, Pluto was also considered a planet. However, in a meeting of International Astronomical Union, a decision was taken to group Pluto as a dwarf planet, with other recently discovered celestial objects, due to its smaller size.

Q.4. What are the differences between terrestrial planet and jovian planets?

Ans. The main differences between the two are summarized below:

- The terrestrial planets were formed in the close vicinity of the planet star where it was too warm for gases to condense to solid particles. Jovian planets were formed at a quite distant location.
- The solar wind was most intense nearer the sun, so it blew off lots of gas and dust from the terrestrial planets. The solar winds were not all that intense to cause similar removal of gases from the Jovian planets.

- The terrestrial planets are smaller and their lower gravity could not hold the escaping gases. Jovian planets are bigger and have high gravity.

Q.5. Explain different phases of evolution of planets.

Ans. Evolution of planets can be understood in three stages:

1. **Formation of Disc:** The stars are localised lumps of gas within a nebula. The gravitational force within the lumps leads to the formation of a core to the gas cloud and a huge rotating disc of gas and dust develops around the gas core.
2. **Formation of Planetesimals:** In the next stage, the gas cloud starts and getting condensed and the matter around the core develops into small rounded objects. These small rounded objects by the process of collision develop into what is called planetesimals.
3. **Formation of Planets:** In the final stage, these large number of small planetesimals accrete to form fewer large bodies in the form of planets.

Q.6. What is the "big splat theory", about the formation of moon?

Ans. According to this theory, A large size body of Mars collided with the earth and that portion was separated from the earth. The same portion became as a moon which revolves around the earth.

Long answer Questions

Q.1. How' was the layered structure of the earth developed?

Ans. The planet earth initially was a barren, rocky arid hot object with a thin atmosphere of hydrogen and helium. It is said that in initial stage the earth was in liquid form.

- Due to gradual increase in density the temperature inside has increased. As a result the material inside started getting separated depending on their densities.
 - This allowed heavier materials (like iron) to sink towards the centre of the earth and the lighter ones to move towards the surface.
 - With passage of time it cooled further and solidified and condensed into a smaller size.
 - This later led to the development of the outer surface in the form of a crust.
 - It is through the process of differentiation that the earth forming material got separated into different layers.

Q.2. Differentiate between inner planets and outer planets.

Ans. The difference between inner planets and outer planets.

Inner Planets	Outer Planets
1. Mercury, Venus, Earth and Mars are called Inner Planets	1. Jupiter, Saturn, Uranus, Neptune are Outer Planets
2. They are found between belt of asteroids and the sun	2. They are found after the belt of asteroids
3. They are also called terrestrial planets	3. They are called Jovian planets
4. Smaller in size	4. Larger in size
5. High density	5. Low density
6. Solid rocky state	6. Gaseous state
7. They are warm	7. They are cold

Q.3. What are different stages of development of atmosphere?

Ans. In the early stage the atmosphere with hydrogen and helium is supposed to have been stripped off as a result of intense solar winds. In the second stage during the cooling of the earth, gases and water vapour were released from the interior solid earth. Continuous volcanic eruptions contributed water vapour and gases to the atmosphere. As the earth cooled, the water vapour released started getting condensed. Third stage was the stage of photosynthesis.

Q.4. Explain "Expanding universe theory". Who gave this?

Ans. The Big Bang Theory, also called as expanding universe hypothesis. Edwin Hubble in 1920 provided the evidence that the universe is expanding. The galaxies move farther as the time passes. It says that galaxies are moving away from each other. The universe appears to be growing larger.

The Big Bang Theory:

1. In the beginning, all matter forming the universe existed in one place in the form of a 'tiny ball' with an unimaginably small volume, infinite temperature and infinite density.
2. At the Big bang "tiny ball" exploded violently. This led to a huge expansion. This continues even to the present day. There was particularly rapid expansion within fractions of a second after the bang. Thereafter, the expansion has slowed down within first three minutes from the Big Bang event, the first atom began to form.
3. Within 300,000 years from the big Bang, temperature dropped to 4,500k and gave rise to atomic matter. The universe became transparent.

4. The expansion of universe means increase in space between the galaxies.

Q.5. Explain the collision and accretion hypothesis associated with the evolution of the earth.

Or

Explain the earliest theory associated with the origin of the earth.

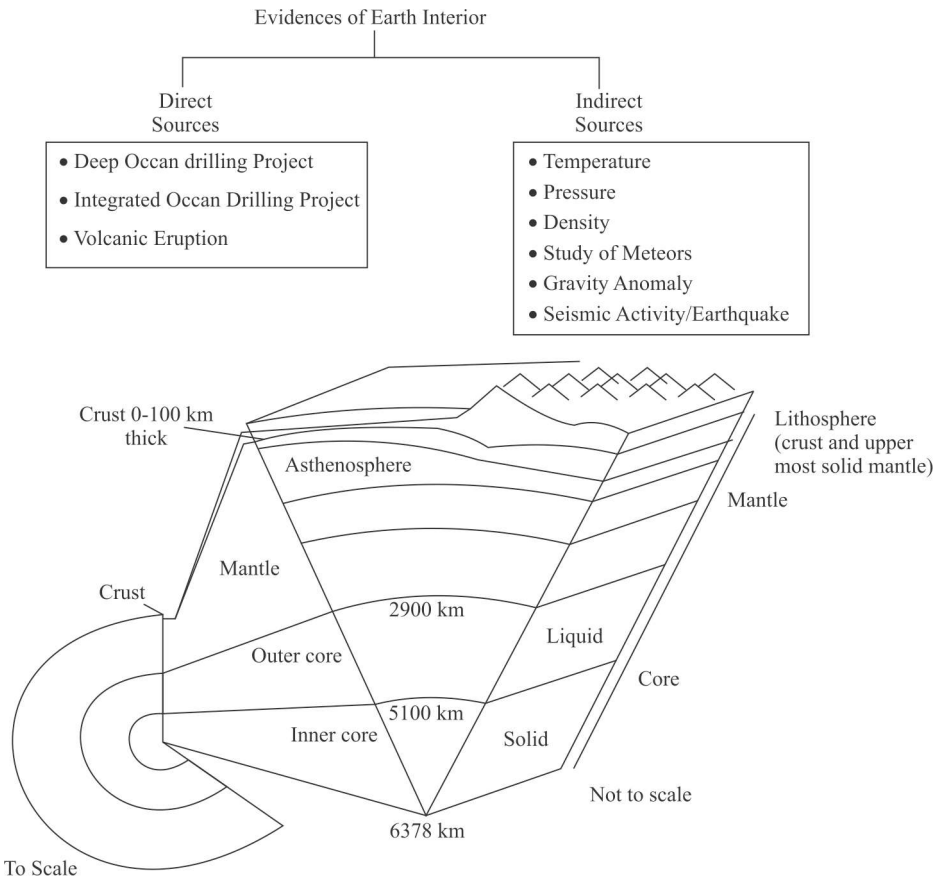
Ans. Collision hypothesis and accretion hypothesis are described below in short.

1. Collision Hypothesis: It was given by Sir James and Harold Jeffrey.
 - According to this theory, a large nebula 'wandering in the space came very close to smaller nebula (Sun) and its huge upsurge of matter on the surface of smaller nebula. The matter was detached from the smaller nebula and on cooling condensed into planets.
2. Accretion Hypothesis: It was given by Schmidt and Carl Weizascar.
 - According to them, solar system started out as a cloud of gas and dust drifting in a space called nebula. This gaseous cloud exploded violently to form supernova. The explosion left the vast spinning cloud and gases and thus to collapse under its own gravity and develop as denser core.
 - The denser core became larger and hotter and began to burge. Later it developed into protostar which finally evolved as infant Sun.
 - Away from its central surface, particles of dust began to clump together and converted into first smaller fragments of rocks and

then becoming larger bodies which were called planetesimals which collided with one another to form rocky inner planets like Mercury, Venus, Earth and Mars and the remaining were outer planets.

Lesson – 3

Interior of the Earth



Multiple-Choice Questions

Q.1. Which one of the following describes the lithosphere?

- (a) Upper and middle mantle
- (b) Crust and Upper mantle
- (c) crust and core
- (d) Mantle and core

Ans. (b) Crust and Upper mantle

Q.2. Magma refers to.....

- (a) Rocks
- (b) Material in upper mantle
- (c) Material in upper core
- (d) Material in the crust

Ans. (b) Material in upper mantle

Q.3. Fast moving waves which reach the earth earliest are called:

- (a) Alpha Waves
- (b) S-Waves
- (c) P-Waves
- (d) Beta Waves.

Ans. (c) P-Waves

Q.4. The upper portion of mantle is called:

- (a) Asthenosphere
- (b) Crust
- (c) Lithosphere
- (d) Fossil Sphere.

Ans. (a) Asthenosphere

Q.5. What is the approximate depth of mantle?

- (a) 2400 km
- (b) 2900 km
- (c) 3200 km
- (d) 3500 km.

Ans. (b) 2900 km

Q.6. Core is made of which metals?

- (a) Iron and Magnesium (b) Iron and Silicon
(c) Nickel and Iron (d) Nickel and Silicon

Ans. (d) Nickel and Iron

Q.7. Density of the core is the highest because-

- (a) Due to heavy pressure of overlying rocks
(b) Due to heavy temperature of overlying rocks
(c) Due to heavy density of overlying rocks
(d) none of the above.

Ans. (a) Due to heavy pressure of overlying rocks

Q.8. Which waves cannot pass through liquid materials?

- (a) Primary Waves (b) Secondary waves
(c) Surface waves (d) All of the above

Ans. (b) Secondary waves

Q.9. Which region of the earth have the greatest density?

- (a) The crust (b) The mantle
(c) outer core (d) Inner core

Ans. (d) Inner core

Q10. Match the following and choose the correct option:

Intrusive structure	Definition
1. Lapolith	A. Horizontal Intrusions
2. Dykes	B. Saucer shaped, concave structures
3. Phacofith	C. Vertical intrusions
4. Sill	D. Wavy mass found in folded structures

(a) 1-D, 2-A, 3-B, 4-C

(b) 1-A, 2-B, 3-C, 4-D

(c) 1-D, 2-C, 3-A, 4-B

(d) 1-B, 2-C, 3-D, 4-A

Ans. (d)

Short Answer Type Questions

Q.1. Highlight the two types of forces that shape the earth surface.

Ans. There are two types of forces:-

1. **Exogenic forces:** These are the forces on the surface of the earth like weathering, erosion, mining, etc.
2. **Endogenic forces:** These are the forces under the surface of the earth, like volcanic eruption, earthquake and any other seismic activity, tectonic plates.

Q.2. What do you mean by gravitational anomaly?

Ans. The difference in gravitation of different places is called gravity anomaly. Gravity anomaly give us information about the distribution of mass of the material in the crust of the earth.

Q.3. What is earthquake? Discuss focus/ hypocentre and epicentre. How do we measure its magnitude and intensity?

Ans. An earthquake is shaking of the earth. It's a Natural event. It is caused due to release of energy, which generates waves that travel in all directions.

- **Focus/Hypocentre:** The point where the energy is released is called the focus/ Hypocentre of an earthquake.
- **Epicentre:** The point on the surface which is nearest to the focus of energy is called epicentre. It is the first one to experience the waves. It is a point directly above the focus.

Measurement of earthquake:

- **Magnitude:** It is measured by Richter Scale
- **Intensity:** It is measured by Mercalli Scale.

Q.4. Give a brief description of caldera.

Ans. These are the most explosive of the earth's volcanoes. Their features are as follows:

They are usually so explosive that when they erupt they tend to collapse on themselves rather than building any tall structure. The collapsed depressions are called calderas.

Their explosiveness indicates that the magma chamber supplying the lava is not only huge but is also in close vicinity.

The hills produced by them are similar to the one made by composite volcanoes.

Q.5. Differentiate between Primary" waves and Secondary" waves

P-Waves	S-Waves
1. These are called primary waves.	These are called secondary waves.
2. These move faster and are the first to arrive at the surface.	These arrive at surface with sometime.
3. The shadow zone of P-wave is much smaller than that of the S-waves.	The shadow zone of S-wave is much large than that of the P-waves.
4. They travel through gaseous, liquid and solid materials.	S-waves can travel only through solid materials.

Q.6. What are the effects of earthquake?

Ans. The following are the immediate hazardous effects of earthquake

- **Loss of life and property:** Ground shaking takes place in earthquake. It leads to loss of life and property. Many buildings fall off and take life of people who were in and around the building.
- **Change in land:** Due to earthquake we can see many changes in the land. Many areas get converted into pits. There are cracks in mountains.
- **Causes landslides and tsunami:** It leads to landslides in mountainous regions and tsunami in oceans. It may further aggravate the calamity and loss of human and property.
- **Destruction of means of communication and transportation:** It leads to destruction of means of communication and transportation. It creates problem in sending help and relief to victims.
- **Other effects:** Earthquake may also lead to breaking or damage of dams which may lead to floods.

Q.7. Differentiate between Lacoliths and Batholiths?

Ans. **Lacoliths:** These are large dome-shaped intrusive bodies with a level base and connected by a pipe-like conduit from below. It resembles the surface volcanic domes of composite volcano, only these are located at deeper depths.

Batholiths: A large body of magmatic material that cools in the deeper depth of the crust develops in the form of large domes. Batholiths are the cooled portion of magma chambers.

Q.8. What are the major materials that comes out during volcanic eruption?

Ans. The material that reaches the ground includes lava flows, pyroclastic debris, volcanic bombs, ash and dust and gases such as nitrogen

compounds, sulphur compounds and minor amounts of chlorine, hydrogen and argon.

Long Answer Type Questions

Q.1. Explain different types of earthquakes.

Ans. The various types of earthquakes are:-

- **Tectonic earthquake:** The most common ones are the tectonic earthquakes. These are generated due to sliding of rocks along a fault plane.
- **Volcanic earthquake:** A special class of tectonic earthquake is sometimes recognised as volcanic earthquake. However, these are confined to areas of active volcanoes.
- **Collapse earthquake:** In the areas of intense mining activity, sometimes the roofs of underground mines collapse causing minor tremors. These are called collapse earthquakes.
- **Explosion earthquake:** Ground shaking may also occur due to the explosion of chemical or nuclear devices. Such tremors are called explosion earthquakes.
- **Reservoir Induced earthquake:** The earthquakes that occur in the areas of large reservoirs are referred to as reservoir induced earthquakes. Sometimes earthquakes also occur in mines due to mining processes. Sometimes earthquakes also occur below the oceans on surface of the ocean causing tsunamis.

Q.2. What are different sources of information about the interior of the earth? Explain with examples.

Ans. Some of the direct sources are-

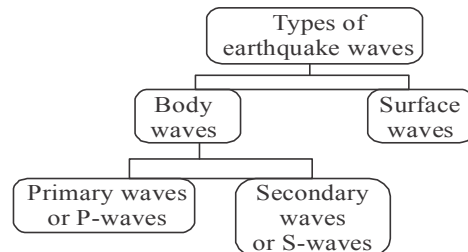
- **Mining:** It is a process by which commercially valuable mineral resources are extracted from Earth's surface which includes precious stones, rocks and solid fuels.
- **Drilling:** Scientists world over are working on two major projects such as "Deep Ocean Drilling projects" and "integrated ocean drilling project". The deepest drill at Kola, in Arctic Ocean, has so far reached a depth of 12 km.
- **Volcanic Eruptions:** When molten material is thrown onto the surface of the earth during volcanic eruption it becomes available for analysis.

Some of the indirect sources of information:

- Knowing the total thickness of the earth, scientists have estimated the values of temperature, pressure and the density of materials at different depths.
- **Meteors:** The material and the structure observed in the meteors are similar to that of the earth. They are solid bodies developed out of materials same as, or similar to, our planet. Hence, this becomes yet another source of information about the interior of the earth.
- **Gravitation:** The gravitation force (g) is not the same at different latitudes on the surface. It is greater near the poles and less at the equator. This is because of the distance from the centre at the equator being greater than that at the poles. The gravity values also differ according to the mass of material.
- **Magnetic surveys:** Magnetic surveys also provide information about the distribution of magnetic materials in the crustal portion, and thus, provide information about the distribution of materials in this part.
- **Earthquake:** It is simple shaking of the earth, through Earthquake waves we get better insight about the earth interior.

Q.3. Explain different types of earthquake waves.

Ans.



Earthquake waves are basically of two types body waves and surface waves.

- **Body waves:** These are generated due to the release of energy at the focus. They move in all directions travelling through the body of the earth. These are less destructive than the surface waves.
- **Surface waves:** The body waves interact with the surface rocks and generate new set of waves called surface waves. These waves move along the surface. These waves are more destructive. The surface waves are the last to report on seismograph. These waves are more destructive. They cause displacement of rocks, and hence, the collapse of structures occurs.

There are two types of body waves. They are called P- and S-waves,

- **P-waves:** They move faster and are the first to arrive at the surface. These are also called primary waves'. The P-waves are similar to sound waves. They travel through gaseous, liquid and solid materials.
- **S-Waves:** S-waves arrive at the surface with some time lag. These are called secondary waves. An important fact about S-waves is that they can travel only through solid materials. This characteristic of the S-waves is quite important. It has helped scientists to understand the structure of the interior of the earth. Reflection causes

waves to rebound whereas refraction makes waves move in different directions. The variations in the direction of waves are inferred with the help of their record on seismograph.

Q.4. Explain how does shadow zone emerge.

Ans. Earthquake waves get recorded in seismographs located at far off locations. However, there exist some specific areas where the waves are not reported. Such a zone is called the 'shadow zone'. The study of different events reveals that for each earthquake, there exists an altogether different shadow zone.

Q.5. Describe the major type of volcanoes found in the world.

Ans. "Volcanoes are classified on the basis of nature of eruption and the form developed at the surface. Major types of volcanoes are as follows:

1. Shield Volcanoes: the shield volcanoes are the largest of all the volcanoes on the earth. These volcanoes are mostly made up of basalt, a type of lava that is very fluid when erupted. For this reason, these volcanoes are not steep.
2. Composite Volcanoes: These volcanoes are characterised by eruptions of cooler and more viscous lavas than basalt. These volcanoes often result in explosive eruptions. Along with lava, large quantities of pyroclastic material and ashes find their way to the ground. This material accumulates in the vicinity of the vent openings leading to formation of layers, and this makes the mounts appear as composite volcanoes.
3. Caldera: These are the most explosive of the earth's volcanoes. They are usually so explosive that when they erupt they tend to collapse on themselves rather than building any tall structure. The collapsed depressions are called calderas.

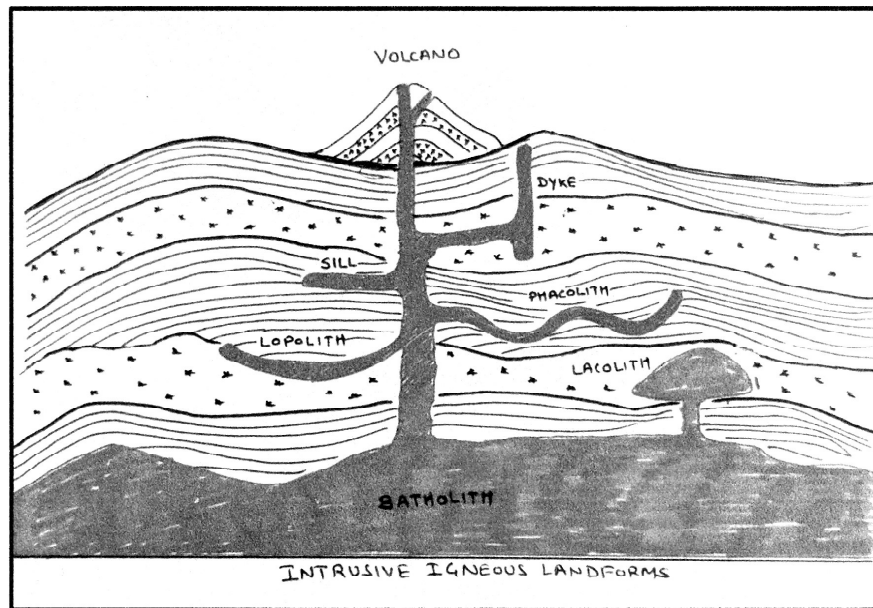
4. Flood Basalt Provinces: These volcanoes outpour highly fluid lava that flows for long distances. Some parts of the world are covered by thousands of sq. km of thick basalt lava flows. There can be a series of flows with some flows attaining thickness of more than 50 m. The Deccan Traps from India, are a much larger flood basalt province.
5. Mid-Ocean Ridge Volcanoes: These volcanoes occur in the oceanic areas. There is a system of mid-ocean ridges more than 70,000 km long that stretches through all the ocean basins. The central portion of this ridge experiences frequent eruptions.

Q.6. What are plutonic rocks? Describe major intrusive structures with diagram.

Ans. The cooling of magma may take place either on reaching the surface or also while the lava is still in the crustal portion. When cooling of magma takes place below or within crust they form plutonic rocks. On the basis of shapes intrusive structures can be classified as:

1. Batholiths: A large body of magmatic material that cools in the deeper depth of the crust develops in the form of large domes. These are granitic bodies. Batholiths are the cooled portion of magma chambers.
2. Lacoliths: These are large dome-shaped intrusive bodies with a level base and connected by a pipe-like conduit from below. It resembles the surface volcanic domes of composite volcano.
3. Lapolith: As and when the lava moves upwards, a portion of the same may tend to move in a horizontal direction wherever it finds a weak plane. It may get rested in different forms. In case it develops into a saucer shape, concave to the sky body, it is called lapolith.

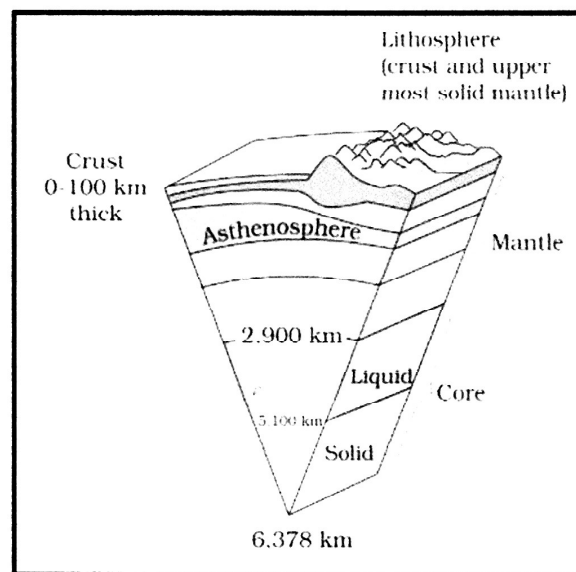
4. **Phacolith:** A wavy mass of intrusive rocks, at times, is found at the base of synclines or at the top of anticline in folded igneous country. Such wavy materials have a definite conduit source beneath in the form of magma chambers (subsequently developed as batholiths). These are called the phacoliths.
5. **Sills:** The near horizontal bodies of the intrusive igneous rocks are called sill or sheet, depending on the thickness of the material. The thinner ones are called sheets while the thick horizontal deposits are called sills.
6. **Dykes :** When the lava makes its way through cracks and the fissures developed in the land, it solidifies almost perpendicular to the ground. These vertical structures are called dyke.



Q.7. Describe the interior structure of the earth with diagram.

Ans. On the basis of direct and indirect evidences earth's interior can be divided into three layers:

1. The Crust: It is the outermost solid part of the earth, The thickness of the crust varies under the oceanic and continental areas. The mean thickness of oceanic crust is 5 km whereas that of the continental is around 30 km. It has very low density and majorly made up of silica and aluminium.
2. The Mantle: The portion of the interior beyond the crust is called the mantle. The mantle extends from Moho's discontinuity to a depth of 2,900 km. The upper portion of the mantle is called asthenosphere. The word astheno means weak. It is considered to be extending upto 400 km. It is the main source of magma that finds its way to the surface during volcanic eruptions. The crust and the uppermost part of the mantle are called lithosphere. Its thickness ranges from 10-200 km. The lower mantle extends beyond the asthenosphere. It is in solid state.
3. The Core; The innermost layer of earth is called core . The outer core is in liquid state while the inner core is in solid state. The core is made up of very heavy material mostly constituted by nickel and iron. It is sometimes referred to as the nife-layer.



Lesson – 4

Distribution of Oceans and Continents

Multiple-Choice Questions

Q.1. Which one of the following term is related to polar fleeing force?

- (a) Revolution of the Earth (b) Gravitation
(c) Rotation of the Earth (d) Tides

Ans. (c) Rotation of the Earth

Q.2. Who was the profounder of plate tectonic theory?

- (a) Arthur Holmes
(b) McKenzie, Parker and Morgan
(c) Admans Heinz
(d) Alfred Wegener.

Ans. (b) McKenzie, Parker and Morgan

Q.3. Tillite is formed due to

- (a) deposits on mountains (b) deposits of volcanoes
(c) deposits of glaciers (d) deposits of gold

Ans. (c) deposits of glaciers

Q.4. Pacific Ocean zone is also called:

- (a) Ring of Fire
- (b) Ball of Fire
- (c) Fire rain area
- (d) Volcanic area

Ans. (a) Ring of Fire

Q.5. Which method has facilitated correlating the rock formation from different continents across oceans?

- (a) The radiometric dating methods
- (b) Carbon 14 method
- (c) Radioactive method
- (d) Fling Method.

Ans. (a) The radiometric dating methods

Q.6. Consider the following statements:

Assertion : Lemurs are found in India, Madagascar and Africa led some to consider a contiguous landmass Lemuria linking these three landmasses.

Reason: Continents were joined together and have shifted their place in geological past. Choose the correct option:

- (a) Only A is correct
- (b) Both A and R are correct and R explains A
- (c) Only R is correct
- (d) Both are incorrect

Ans. (b)

Q.7. Which one of the following is the type of plate boundary of the Indian plate along the Himalayan Mountains?

- (a) Ocean -continent convergence
- (b) Divergent boundary
- (c) Transform boundary
- (d) Continent convergence

Ans. (d) Continent convergence

Q.8. What was the name given by Alfred Wegener to a large continent surrounded with water"?

- (a) Pangaea
- (b) Panthalassa
- (c) Angaraland
- (d) Gondwanaland.

Ans. (a) Pangaea

Q.9. Which one of the following is not a minor plate?

- (a) Nazca
- (b) Arabia
- (c) Philippines
- (d) Antarctica

Ans. (d) Antarctica

Q.10. What was the name given to massive ocean by Wegener?

- (a) Pangaea
- (b) Panthalassa
- (c) Angara land
- (d) Gondwanaland.

Ans. (b) Panthalassa

Q.11. According to Wegener. Pangaea was divided into land forms namely:

- (a) Panthalassa and Angara Land
- (b) Lurasia and Gondwanaland
- (c) Livasa and Continent
- (d) Oceans and Continents.

Ans. (b) Lurasia and Gondwanaland.

Q12. Which of the following statements prove the drifting of the continents as per Alfred Wegener.

1. Coastline of continents across oceans match remarkably
2. Placer deposits of Ghana coast has source in Brazil
3. fossils of identical plants and animals are found in different continents.

- (a) Only 1 is correct
(b) 1, 2, 3 all are correct
(c) Only 1 and 3 are correct
(d) 1,2,3 all are incorrect

Ans. (b)

13. Which of the following is not the part of continental margin:

- (a) Continental Shelf
- (b) Continental slope
- (c) Deep oceanic trench
- (d) Mid oceanic ridge

Ans. (b)

Source Based Questions

Q.14. A detailed analysis of magnetic properties of the rocks on either sides of the mid-oceanic ridge led Hess (1961) to propose his hypothesis, known as the sea floor spreading". Hess argued that constant eruptions at the crest of oceanic ridges cause the rupture of the oceanic crust and the new lava wedges into it, pushing the oceanic crust on either side. The ocean floor, thus spreads. The younger age of the oceanic crust as well as the fact that the spreading of one ocean

does not cause the shrinking of the other, made Hess think about the consumption of the oceanic crust. He further maintained that the ocean floor that gets pushed due to volcanic eruptions at the crest, sinks down at the oceanic trenches and gets consumed.

(A) As the sea floor widens out and gets separated from mid-oceanic ridge, it carries a record of

- | | |
|-----------------------|-----------------------|
| (a) Magnetic reversal | (b) Electric Reversal |
| (c) Thermal reversal | (d) Static |

Ans. (a) Magnetic reversal

(B) The process by which magma rises forming new oceanic lithosphere layers is called

- | | |
|-------------------------|-----------------------|
| (a) Sea reversal | (b) Sea flooring |
| (c) Sea floor spreading | (d) Sea bed spreading |

Ans. (c) Sea floor spreading

(C) The place where sea-floor spreading occurs is termed as

- | | |
|-----------------|----------------------|
| (a) Ditches | (b) Mid-ocean ridges |
| (c) Ocean basin | (d) Craters |

Ans. (b) Mid-ocean ridges

Very Short Questions

Q.1. According to Wegener, what are the causes of drifting of continents?

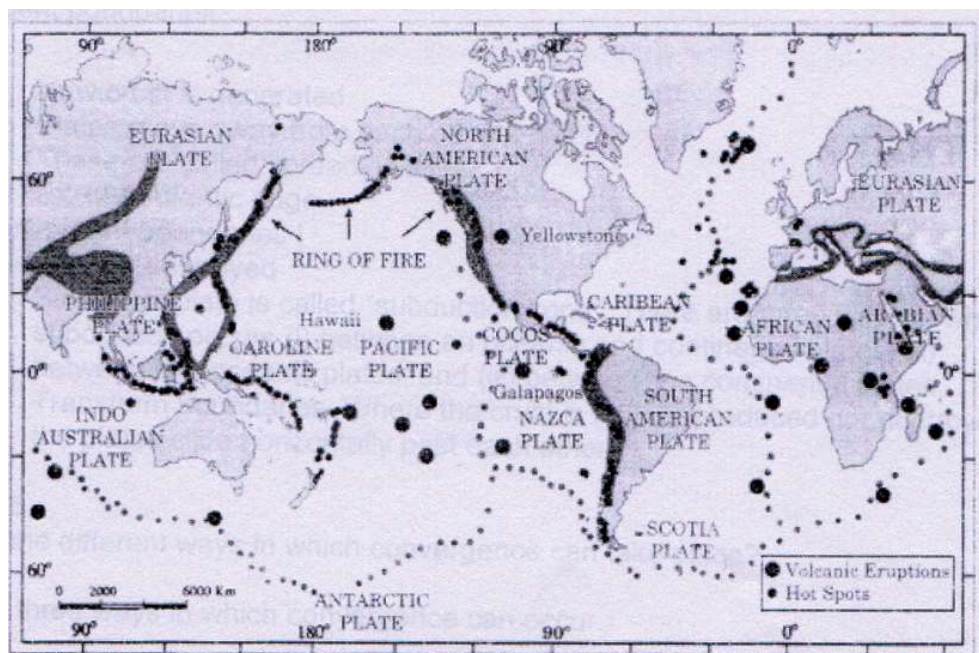
Ans. Two causes were responsible for the drifting of the continents:

- Polar-fleeing force and
- Tidal force.

Q.2. Explain the distribution of earthquake and volcanic plate on the earth,

Ans. There are three major belts as follows:

1. It goes from Atlantic Ocean almost parallel to the coastlines. It further extends into the Indian Ocean.
2. Another area of concentration coincides with the Alpine-Himalayan system and the rim of the Pacific Ocean.



3. The rim of the Pacific is also called rim of fire due to the existence of active volcanoes in this area.

Q.3. Explain the basic concept of continental drift theory.

Ans. Alfred Wegener, a German meteorologist, put forth a comprehensive argument in the form of "the continental drift theory" in 1912.

According to Wegener, all the continents formed a single continental mass and mega ocean surrounded the same. He called the super continent as PANGAEA and mega ocean as PANTHALASSA.

Around 200 million years ago, the super continent, Pangaea, began to split. Pangaea first broke into two large continental masses as Laurasia and Gondwanaland forming the northern and southern components respectively.

Subsequently, Laurasia and Gondwanaland continued to break into various smaller continents that exist today.

Q.4. Differentiate between divergent and convergent plate boundaries.

Ansr. **Divergent boundaries**

- New crust is generated
- Plates move away from each other
- These are called spreading sites
- Ex. Mid Atlantic ridge

Convergent boundaries

- Crust is destroyed
- Sinking of plate is called "subduction zone". There are three ways in which subduction occurs (i) between an oceanic and continental plates; (ii) between two oceanic plates; and (iii) between two continental plates.
- **Transform boundaries:** Where the crust is neither produced nor destroyed as the plates slide horizontally past each other.

Q.5. What are the different ways in which convergence can take place?

Ans. There are three ways in which convergence can occur.

between an oceanic and continental plate:

between two oceanic plates; and

between two continental plates.

Q.6. What are mid-oceanic ridges?

Ans. This forms an interconnected chain of mountain system within the ocean. It is the longest mountain-chain on the surface of the earth though submerged under the oceanic water. It is characterized by a central rift system at the crest, a fractionated plateau and flank zone all along its length. The rift system at the crest is the zone of intense volcanic activity.

Q7. Convictional current theory has revived continental drift theory. Justify.

Ans. Continental drift theory was strong in terms of the evidences of the drift. But forces responsible for drift could not be well explained by Wegener. It was considered the weakest part of his theory. Scholars considered polar fleeing and tidal force inadequate for the moment thus discarded the theory.

Later, when Arthur Holmes came up with Convictional current theory which states that strong convectional currents are present in the mantle which could even move crustal blocks. This explained force responsible for drifting of the continents. Thus reviving continental drift theory once again.

Long answer questions

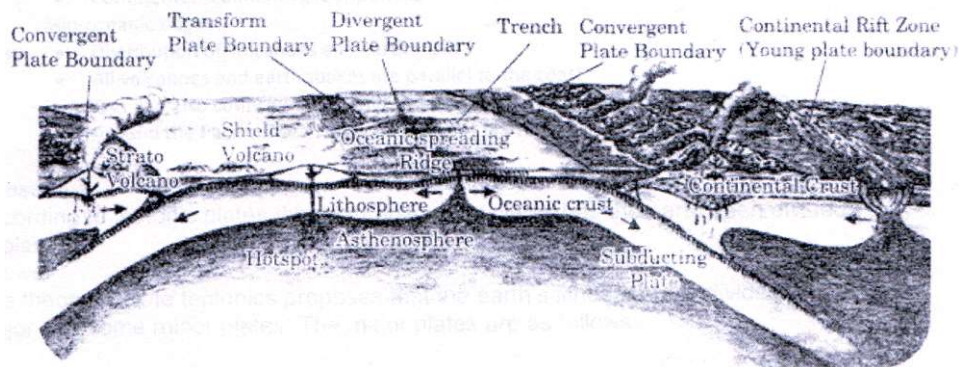
Q.1. "Oceans are still expanding" In the view of the statement explain the theory of sea floor spreading.

Ans. Hess argued that constant eruptions at the crest of oceanic ridges cause the rupture of the oceanic crust forces and the new lava wedges

into it, pushing the oceanic crust on either side. The ocean floor, thus spreads. Two facts made Hess think about the consumption of the oceanic crust.

- The younger age of the oceanic crust
- The spreading of one ocean does not cause the shrinking of the other.

He further maintained that the ocean floor that gets pushed due to volcanic eruptions at the crest sinks down at the oceanic trenches and gets consumed. The basic concept of sea floor spreading has been depicted in the given figure:



Q.2. Discuss different types of boundaries that form as a result of tectonic plates.

Ans. Three types of boundaries are formed as a result of tectonic plates:

- **Convergent Boundaries:** Where the crust is destroyed as one plate dived under another, it is called convergent boundaries.
- **Divergent Boundaries:** Where new crust is generated as the plates pull away from each other, these are called divergent boundaries.
- **Transform Boundaries:** Where the crust is neither produced nor destroyed as the plates slide horizontally past each other.

Q.3. The ocean floor may be segmented into how many divisions based on the depth as well as the forms of relief?

Ans. The ocean floor may be segmented into three major divisions based on the depth as well as the forms of relief. These divisions are:

- (i) Continental margins,
- (ii) Abyssal plains and
- (iii) Mid-oceanic ridges.

1. Continental margins

- Form transitional zone between continental shore and deep sea basins
- They include continental slope , shelf, continental rise and deep oceanic trenches

2. Abyssal Plains

- Extensive Plains
- Found between continental margin and mid oceanic ridge
- Continental sediments get deposited

3. Mid-Oceanic Ridges

- Distribution of volcanoes and earthquakes
- All volcanoes and earthquakes are parallel to the coast
- This line also co-incides with mid- Atlantic ridge and Alpine Himalayan system
- Around the Pacific Ocean it is called ring of fire mid oceanic ridges.

Q.4. According to tectonic plates theory in how many plates has the earth been divided?

Ans. The theory of plate tectonics proposes that the earth's lithosphere is divided into seven major and some minor plates. The major plates are as follows:

- Antarctica and the surrounding oceanic plate
- North American plate
- South American plate
- Pacific plate
- India-Australia-New Zealand plate
- Africa with the eastern Atlantic floor plate
- Eurasia and the adjacent oceanic plate.

Some important minor plates are:

- Cocos plate: It is between Central America and Pacific plate
- Nazca plate: It is between South America and Pacific plate
- Arabian plate: It includes mostly the Saudi Arabian landmass
- Philippine plate: It is between the Asiatic and Pacific plate
- Caroline plate: It is between the Philippine and Indian plate (North of New Guinea)
- Fuji plate: It includes North-east of Australia.

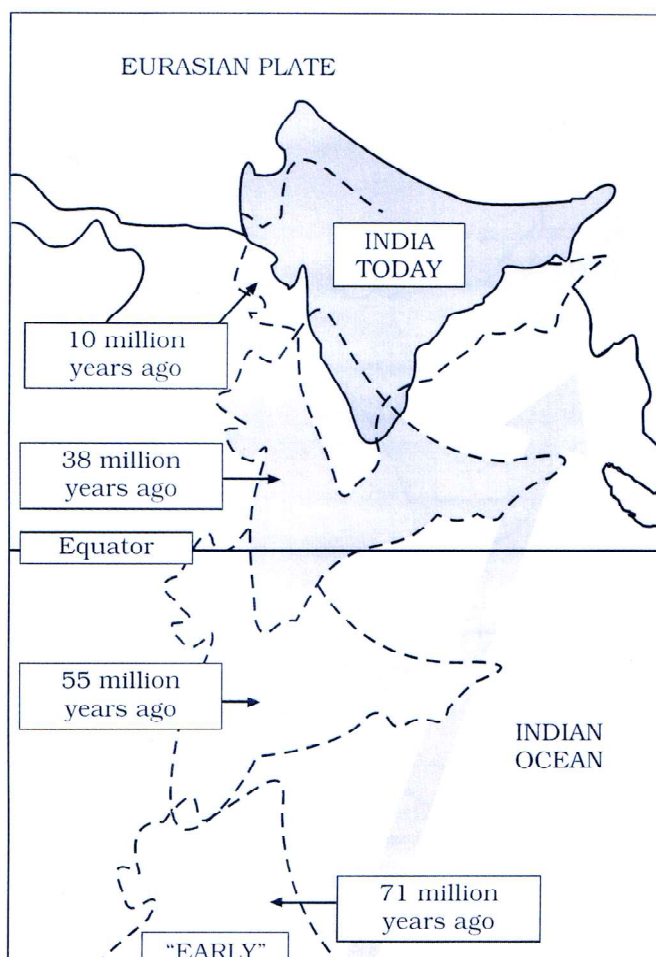
Pacific plate is largely an oceanic plate whereas the Eurasian plate may be called a continental plate. Plates are not static. Plates may converge or diverge. Plates may break as well.

Q.5. Explain the movement in Indian plate.

Or

The movement of Indian tectonic plate is still in continuation. Justify

Ans. The Indian plate includes Peninsular India and the Australian continental portions. The Tethys Sea separated it from the Asian continent till about 225 million years ago. India is supposed to have started her northward journey about 200 million years ago at the time when Pangaea broke. India collided with Asia about 40-50 million years ago causing rapid uplift of the Himalayas. About 140 million years before the present, the subcontinent was located as south as 50°S. latitude.



The two major plates were separated by the Tethys Sea and the

Tibetan block was closer to the Asiatic landmass. During the movement of the Indian plate towards the Asiatic plate, a major event that occurred was the outpouring of lava and formation of the Deccan Traps. This started somewhere around 60 million years ago and continued for a long period of time. The subcontinent was still close to the equator. From 40 million years ago and thereafter, the event of formation of the Himalayas took place. Scientists believe that the process is still continuing and the height of the Himalayas is rising even to this date.

Q.6. What information do we get from the mapping of the ocean floor and palaeomagnetic studies of rocks from oceanic regions?

Ans. The mapping of the ocean floor and palaeomagnetic studies of rocks from oceanic regions gave following information:

- Along the mid-oceanic ridges, volcanic eruptions are common and they bring huge amounts of lava to the surface in this area.
- The rocks equidistant on either sides of the crest of mid-oceanic ridges show remarkable similarities in terms of period of formation, chemical compositions: and magnetic properties.
- The ocean crust rocks are much younger than the continental rocks. The age of rocks in the oceanic crust is nowhere more than 200 million years old. Some of the continental rock formations are as old as 3,200 million years.
- The sediments on the ocean floor are unexpectedly very thin. Scientists expected that if the ocean floors were as old as the continent, to have a complete sequence of sediments for a period of much longer duration. However, nowhere was the sediment column found to be older than 200 million years.
- The deep trenches have deep-seated earthquake occurrences

while in the mid-oceanic ridge areas, the quake foci have shallow depths.

Q.7. Give a broad comparative outlook of continental drift theory, sea floor spreading and plate tectonic theory.

Ans. **Comparison: Continental Drift-Sea Floor Spreading-Plate Tectonics**

	Continental Drift	Sea Floor Spreading	Plate Tectonics
1. Propounder	1. Put forward by Alfred Wegener in 1920s	1. Arthur Holmes explained Convective Current Theory in the 1930s. Based on convection current theory, Harry Hess explained Sea Floor Spreading in the 1940s	1. In 1967, McKenzie and Parker suggested the theory of plate tectonics. Morgan later outlined the theory in 1968
2. Theory	2. Explains the Movement of Continents only	2. Explains the Movement of Oceanic Plates only plates that include both	2. Explains the Movement of Lithospheric continents and oceans.
3. For movement	3. Buoyancy, gravity, pole-fleeing force, tidal currents tides	3. Convection currents in the mantle drag crustal plates	3. Convection current in the mantle drag crustal plates

4. Evidence	4. Apparent affinity of physical features, botanical evidence, fossil evidence, Tillite deposits, placer deposits, rocks of same age across different continents etc.	4. Ocean bottom relief, Paleomagnetic rocks, distribution of earthquakes and volcanoes etc. and volcanoes, gravitational anomalies at trenches etc.	4. Ocean bottom relief, Paleomagnetic rocks, distribution of earthquakes
5. Criticism	5. Too general with silly and sometimes illogical evidence	5. Doesn't explain the movement of continental plates.	
6. Usefulness	6. Helped in the evolution of Convection current theory and seafloor spreading theory	6. Helped in the evolution of plate tectonics theory features.	6. Helped us understand various geographical

Q.8. What Evidences can be given in favor of continental drift theory? Explain.

Ans. Evidence supporting the Continental Drift Theory

1. The matching of Continents (Jig-Saw-Fit)

- The coastlines of South America and Africa fronting each other have a remarkable and unique match.

2. Rocks of the Same Age across the Oceans

- The radiometric dating methods have helped in correlating the

formation of rocks present in different continents across the ocean.

- The ancient rocks belts on the coast of Brazil match with those found in Western Africa.

3. Tillite

- It is the sedimentary rock made from glacier deposits.
- The Gondwana system of sediments from India is recognized as having its counterparts in 6 different landmasses in the Southern Hemisphere.

4. Placer Deposits

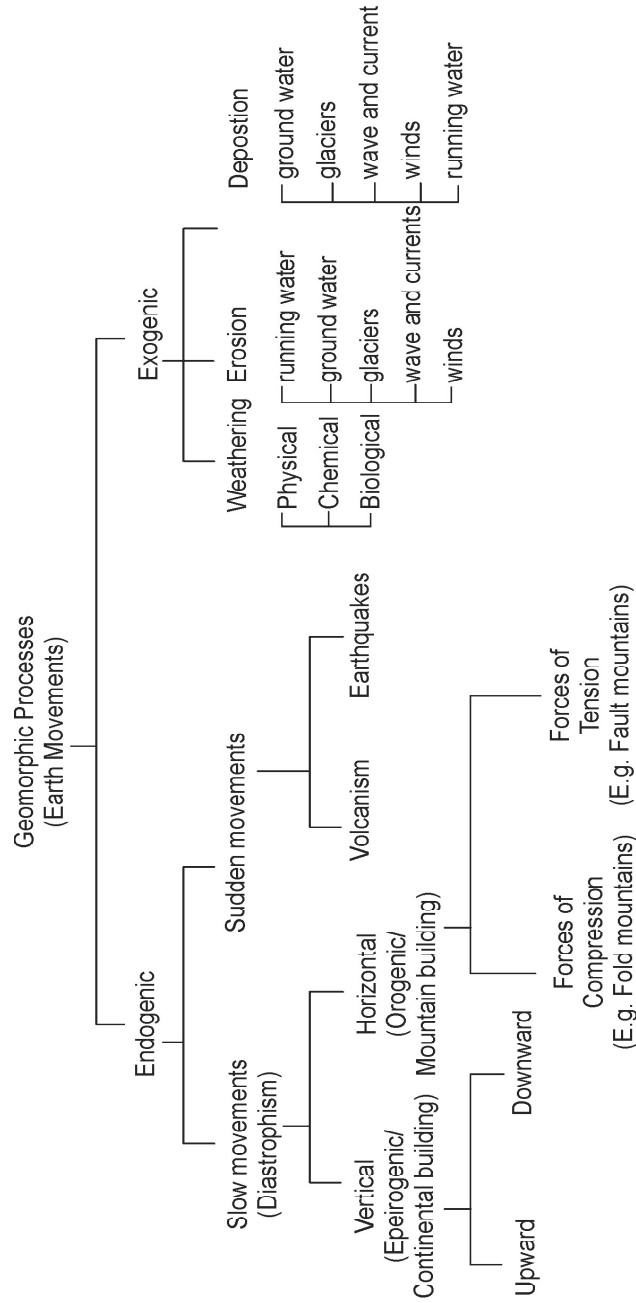
- The presence of abundant placer deposits of gold along the Ghana coast and the complete lack of its source rocks in the area is a phenomenal fact.
- The gold-bearing veins are present in Brazil and it is evident that the gold deposits of Ghana IN Africa are obtained from the Brazil plateau from the time when the two continents were beside each other.

5. Distribution of Fossils

- The interpretations that Lemurs occur in India, Africa, and Madagascar led to the theory of a landmass named "Lemuria" connecting these 3 landmasses.

Lesson – 6

Geomorphic Processes



Multiple-Choice Questions

Q.1. What kind of changes are brought by internal forces?

- (a) They give birth to new land forms
- (b) They promote moisture
- (c) Both a and b
- (d) None of the above

Ans. (a) They give birth to new landforms

Q.2. Why is the earth's surface uneven?

- (a) Because of Gravity
- (b) Due to thermal energy
- (c) due to endogenic and exogenic processes
- (d) All of the above

Ans. (c) due to endogenic and exogenic processes

Q.3. The science in which soil is studied in depth is

- (a) Pedology
- (b) Geology
- (c) Meteorology
- (d) None of these

Ans. (a) Pedology

Q.4. Which of the following is a form of weathering?

- (a) Physical
- (b) Chemical
- (c) Biological
- (d) All of the above

Ans. (d) All of the above

Q.5. The capacity of rocks to allow water to pass through is called.....

- (a) Porosity/Permability
- (b) Wedging
- (c) Exfoliation
- (d) Hydration

Ans. (a) Porosity/permability

Q.6. Which is the force that continuously elevates or build up parts of the earth's surface?

- (a) Exogenetic forces
- (b) Endogenetic Forces
- (c) Gradation
- (d) Degradation

Ans. (b) Endogenetic Forces

Q.7. Which type of weathering occurs due to growth of ice within pores and cracks of rocks during repeated cycles of freezing and melting?

- (a) Frost weathering
- (b) Landslides
- (c) Water weathering
- (d) Crystallisation.

Ans. (a) Frost weathering

Q.8. Which of the following is an example of endogenetic forces?

- (a) Erosion
- (b) Volcanism
- (c) Weathering
- (d) Deposition

Ans. (b) Volcanism

Q.9. Weathering is an important process for what?

- (a) Formation of clouds
- (b) Formation of soil
- (c) Formation of water
- (d) All of the above

Ans. (b) Formation of soil

Q.10. Where' does oxidation take place?

- (a) Where there is ready access to the atmosphere and oxygenated waters.
- (b) Where there are plants.
- (c) Where there is moisture in air.
- (d) In mountainous regions.

Ans. (a) where there is ready access to the atmosphere and oxygenated waters.

Q.11. What are geomorphic causes of erosion?

- (a) Flowing water
- (b) Underground water
- (c) Wind
- (d) All of the above

Ans. (d) All of the above

Q.12. Which of the following process is not associated with physical weathering?

- (a) Frost wedging
- (b) Expansion
- (c) Carbonation
- (d) Thawing

Ans. (c) Carbonation

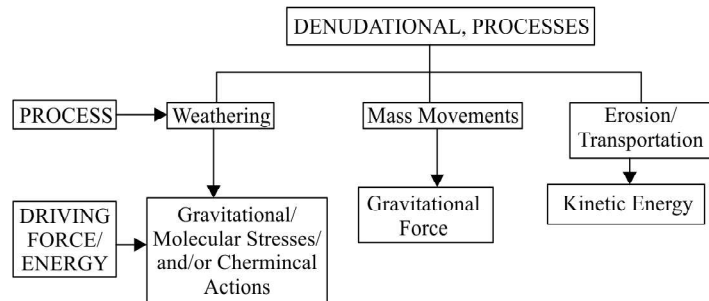
Q.13. Which of the following factor is not associated with soil formation?

- (a) Parent rock
- (b) Climate
- (c) Time
- (d) Exfoliation

Ans. (d) Exfoliation

SOURCE BASED QUESTION

Q.14.



(A) Denudation process is the sum total of:

- (a) Weathering
- (b) Mass movement
- (c) Erosion or transportation
- (d) All of the above

Ans. (d) All of the above

(B) Which driving force is responsible for mass movement?

- (a) Exogenic Forces
- (b) gravitational Force
- (c) Kinetic energy
- (d) All of the above

Ans. (b) gravitational Force

(C) Denudation process happens in which order?

- (a) Weathering, Erosion, Deposition, Transportation
- (b) Erosion, Weathering, transportation, deposition
- (c) Erosion, Transportation, Weaihering, Deposition
- (d) Transportation, Weathering, Erosion, Deposition

Ans. (a) Weathering, Erosion, Deposition, Transportation

Short Answer Type Questions

Q.1. What is weathering? How do weathering activities work?

Ans. Weathering is defined as mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate

A group of weathering processes via: solution, carbonation, hydration, oxidation and reduction act on the rocks to decompose, dissolve or reduce them to a fine classic state through chemical reactions by oxygen, surface and/or soil water and other acids.

There are three major groups of weathering processes:

- (i) chemical;
- (ii) physical or mechanical;
- (iii) Biological weathering processes.

Q.2. Physical weathering depends on some applied forces. What are these?

Ans. Physical or mechanical weathering processes depend on some applied forces. The applied forces could be:

- Gravitational forces such as overburden pressure, load and shearing stress.
- Expansion forces due to temperature changes, crystal growth or animal activity.
- Water pressures controlled by wetting and drying cycles.

Q.3. Examine the following terms:

1. Denudation
2. Enrichment
3. Gradation
4. geomorphic process
5. Geomorphic agents
6. Tors
7. Stress

Ans.

1. The term 'denude' means to strip off or to uncover. Weathering, mass wasting' movements, erosion and transportation are included in denudation.
2. When rocks undergo weathering, some materials are removed through chemical or physical leaching by groundwater and thereby the concentration of valuable materials increases. It makes the concentration of the same valuable material sufficient and economically viable to be exploited, processed and refined. This is called enrichment.
3. The phenomenon of wearing down of relief variation of the surface of the earth through erosion is known as gradation.
4. The endogenic and exogenic forces causing physical stresses and chemical actions on earth material and bringing about changes in the configuration of the surface of the earth is known as geomorphic process.

5. Any exogenic elements of nature (like water, ice, wind, etc.) capable of acquiring and transporting earth materials-can be called geomorphic agents. An agent is a mobile medium (like running water, moving ice. etc.) which removes, transports and deposits earth materials. Examples: Running water, glacier, wind waves and currents, etc. can be called geomorphic agents.
6. In rocks like granites, smooth surfaced and rounded small to big boulders form due to such exfoliation. It is called tors.
7. Gravitational force acts upon all earth materials having a sloping surface and tend to produce movement of matter in down slope direction. Force applied per unit area is called stress.

Q.4. What are the two main ways in which soil organisms contribute in soil formation? What would happen to the fertility of a soil if all decomposers were removed? Explain.

Ans. Living organisms are responsible for forming humus and mixing the soil. Decomposers like: fungi, worms, and bacteria breakdown organic matter into humus which is enriched with the nutrients needed by the plants.

Other animals add nitrogen to the soil in the form of metabolic waste.

Without the help of decomposers, humus would not form. In addition, the remains of living organisms will not be decomposed and nitrogen would not be returned back to the soil. Hence the soil will have a poor, infertile quality.

Q.5. Explain different types of chemical weathering.

Ans. Different types of chemical weathering includes:

1. **Oxidation and Reduction:** Oxidation is the effect of oxygen in air

and water on the rocks The atmospheric oxygen in rainwater unites with minerals in rocks especially with iron compounds. When oxidized minerals are placed in an environment where oxygen is absent, reduction takes place. It exists normally below water table, in area of stagnant water in more hot and humid climates.

2. **Carbonation:** When the carbon dioxide in atmosphere dissolves in water it form carbonic acid that affects the rocks, it is carbonation. It has acidic affect and dissolves calcium carbonates and magnesium carbonates such as gypsum, marble, limestone.
3. **Hydration:** When the hydrogen of water dissolves in rocks hydration occurs. Certain minerals in rocks increase their volume and become heavy when absorb water contains hydrogen. They break due to its increased pressure and the color also changes.
4. **Solution:** Rainwater is able to dissolve certain minerals and leaching of the soil occurs. Normally solids are also removed during leaching. For e.g.: gypsum, rock salt. etc. undergo solution.

Q.6. What factors have caused diastrophism?

Ans. All processes that move, elevate or build up portions of the earth's crust come under diastrophism. They include:

- **Orogenic processes:** It involves mountain building through severe folding and affecting long and narrow belts of the earth's crust:
- **Epeirogenic processes:** It involves continental building through uplift or warping of large parts of the earth's crust.
- **Earthquakes:** It involves local relatively minor movements;
- **Plate tectonics:** It involves horizontal movements of crustal plates.

All these processes-cause pressure, volume and temperature (PVT) changes which in turn induce metamorphism of rocks.

Q.7. What factors activate the process of mass movement?

Ans. Following factors activate the process of mass movement.

- Removal of support from below to materials above through natural or artificial means:
- Increase in gradient and height of slopes;
- Overloading through addition of materials naturally or by artificial filling:
- Overloading due to heavy rainfall, saturation and lubrication of slope materials;
- Removal of material or load from over the original slope surfaces:
- Occurrence of earthquakes, explosions or machinery;
- Excessive natural seepage:
- Heavy drawdown of water from lakes, reservoirs and rivers leading to slow outflow of water from under the slopes or river banks;
- Indiscriminate removal of natural vegetation.

Q.8. Deposition is the result of erosion. Explain.

Ans. Deposition is a consequence of erosion. The erosional agents lose their velocity and hence energy on gentler slopes and the materials carried by them start to settle themselves. In other words, deposition is not actually the work of any agent. The coarser materials get deposited first and finer ones later. By deposition depressions get filled up. The same erosional agents viz., running water, glaciers, wind,

waves and groundwater act as aggradational or depositional agents also.

Q.9. Without gravity and gradient will there be no erosion? justify.

Ans. Gravity besides being a directional force activates down slope movement of matters and also causes stresses on earth material.

- Without gravity and gradients there would be no mobility and hence no erosion, no transportation and no deposits as gravitation stresses are as important as the other geomorphic process.
- Gravity is force that is keeping us in contact with the surface and it is the force that switches on the movement of all surface material on earth.
- All the movement either within the earth or on the surface of the earth occurs due to gradients from higher levels to lower levels and from high pressure to low pressure areas.

Q.10. What is the importance of weathering?

Ans. Importance of weathering:

- Weathering processes are responsible for breaking down the rocks into smaller fragments and preparing the way for formation of not only regolith and soils but also erosion and mass movement. Biomes and bio-diversity is basically a result of forests depend upon the depth of weathering mantles.
- Weathering aids mass and deposits helps in the enrichment and concentrations of certain valuables ores of iron, manganese, aluminium, etc. which are of great importance for the national economy.
- Weathering is an important process in the formation of soils.

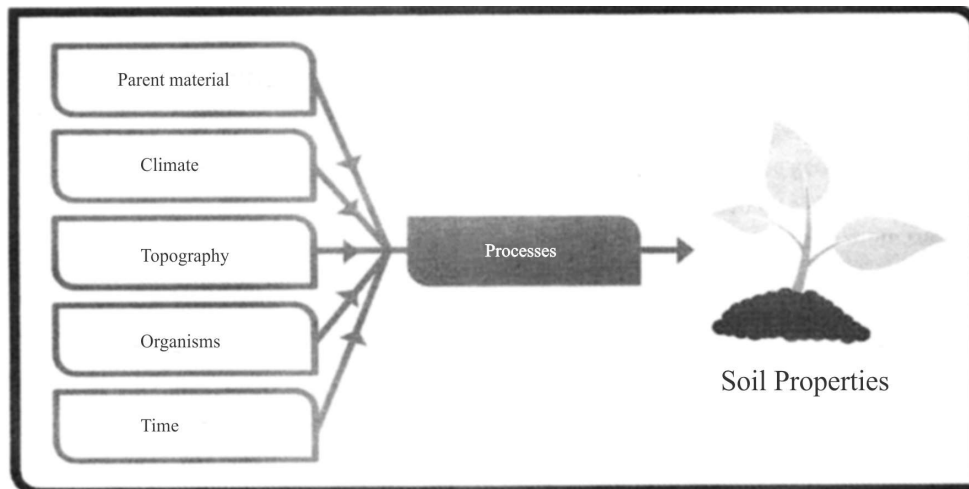
Long Answer Type Questions

Q.1. What are the main factors affecting soil formation? How these factors are helpful in soil formation?

Ans. The main factors affecting soil formation are;

Climate is a direct factor in soil formation. It determines how temperature and moisture vary and determines the intensity of the weathering processes. Indirectly, climatic factors also govern vegetation growth at the interface of soil, atmosphere and biosphere.

- Organisms, including flora and fauna, are not an independent factor in soil formation. Both continuously interact with climate, relief and soil parent material over time. Vegetation delivers organic material for humus formation and a forest regulates the climate of its surrounding.
- Relief and topography define the micro-climatic conditions under which soil formation takes place, as well as the proximity of soil to the ground water table. Soils on steep, barren terrain are more prone to erosion than those on plains, or on plant-covered surfaces.
- Parent material in the form of rock and sediment builds the initial substrate for soil formation. It defines a soil's chemical and mineralogical composition and influences soil texture and structure.
- Time describes an ongoing factor of soil formation. The intensity and combination of different factors leading to soil formation change over time. Time, therefore, is not always an indicator of the exact age of a soil or the stage of a soil's development.



Q.2. What is the sole driving force behind all the exogenic processes?
Explain how?

Ans. Solar energy is the sole driving force behind all exogenic processes. Exogenic processes derive their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors.

1. Various minerals in rocks possess their own limits of expansion and contraction.
2. With rise in temperature, every mineral expands and pushes against its neighbour and as temperature falls, a corresponding contraction takes place. Because of diurnal changes in the cause splitting of individual grains within rocks, which eventually fall off. This process of falling off of individual grains may result in granular disintegration or granular foliation. Salt crystallisation is most effective of all salt-weathering processes.
3. In areas with alternating wetting and drying conditions salt crystal growth is favored and the neighboring grains are pushed aside.

Sodium chloride and gypsum crystals in desert areas heave up overlying layers of materials and with the result polygonal cracks develop all over the heaved surface. With salt crystal growth, chalk breaks down most readily, followed by limestone, sandstone, shale, gneiss and granite etc.

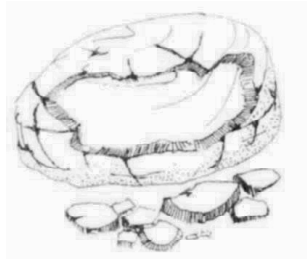
Q.3. Why Exogenic geomorphic processes differ from region to region?

Ans. Factors Controlling Exogenic Geomorphic Processes

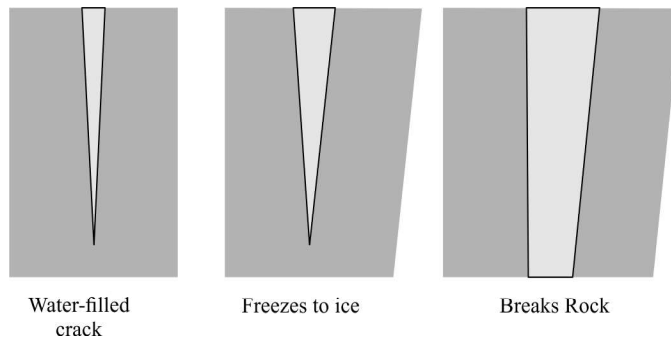
1. The earth has different climatic regions with different thermal gradients created due to variations in latitude season and distribution of land and water.
2. The density, type and distribution of vegetation which largely depend upon precipitation and temperature indirectly influence exogenic geomorphic processes.
3. Within broad climatic regions local variations are caused by altitude and other aspect for example, south facing slopes in the northern hemisphere receive more sunlight than north facing slopes.
4. Further differences arise due to variations in wind velocity and direction, due to differences in wind velocities and directions, amount intensity and the precipitation and its relationship with evaporation, daily range of temperature, depth of frost penetration and frequency of freeze and thaw.
5. Climatic factors being equal, the intensity of exogenic geomorphic processes depends upon type and structure of rocks.
6. Depending on their structure rocks offer varying resistance to various geomorphic processes. A particular rock may be resistant to one process and nonresistant to another.

Q.4. Explain the different processes of weathering with the help of suitable diagram.

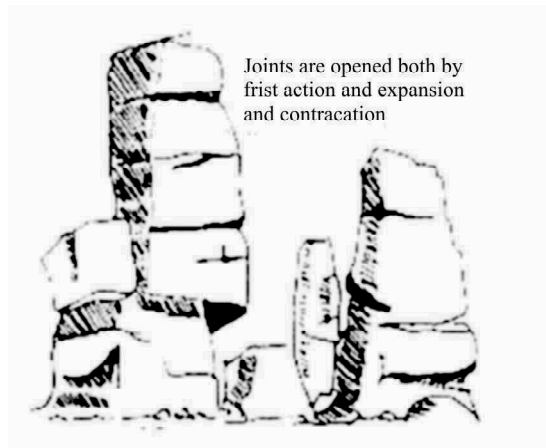
Ans. 1. Exfoliation



2. Frost wedging



3. Contraction and Expansion



Lesson – 7

Landform & their Evolution

Objective/Multiple Type Questions

Q.1. A Barchan is a landform made by _____ work of _____.

Ans. depositional, wind.

Q.2. Arrange the correct sequence of column II against column I.

Column I (Agent)

- I. Wind
- II. Underground water
- III. Running water
- IV. Waves

Column II (Landform)

- 1. Rapids
- 2. spits
- 3. Playas
- 4. Dolines.

- (a) III - 3 IV - 1 II - 4 I - 3
- (b) II - 4 I - 3 IV - 2 III - 1
- (c) II - 3 I - 1 IV - 2 III - 4
- (d) III - 4 IV - 1 II - 3 I - 2

Ans. (b) II - 4 I - 3 IV - 2 III - 1

Q.3. Which of the following indicates direction of glacier movement?

- (a) Eskers
- (b) Drumlins
- (c) Moraines
- (d) Arete

Ans. (b) Drumlins.

Q.4. Which of the following describes Dolines?

- (a) Lapias
- (b) Collapse sinks
- (c) limestone Caves
- (d) Pillars

Ans. (b) Collapse Sinks

Q.5. _____ includes lifting and removal of dust and smaller particles from the surface of rocks.

Ans. Deflation.

Q.6. In which of the following stage of landform development, most of the landscape is at or slightly above sea level?

- (a) Mature stage
- (b) Old stage
- (c) Youtn stage
- (d) Early mature stage

Ans. (b) Old stage

Q.7. Which of the following is not a type of valley?

- (a) Gorge
- (b) V-shaped valley
- (c) Rapids
- (d) Canyon

Ans. (c) Rapids

Q.8. Which one of the following is not associated with wind work?

- (a) Sand dunes
- (b) Mushroom
- (c) Lapies
- (d) Playa

Ans. (c) Lapies

Q.9. Resistant masses of rock, originally parts of a cliff or hill are called _____.

Ans. Sea stacks

Q.10. When very deep and wide meanders are found in hard rocks, they are called.....

Ans. Incised or entrenched meanders.

Diagram/Source Based Questions.

Q. I. Read the paragraph and answer the following questions.

Stalactites hang as icicles of different diameters. Normally they are broad at their bases and taper towards the free ends showing up in a variety of forms. Stalagmites rise up from the floor of the caves. In fact, stalagmites form due to dripping water from the surface or through the thin pipe, of the stalactite, immediately below it.

1. Above paragraph is associated with which geomorphic agent?

- (a) Ground water
- (b) Glacier
- (c) Wind
- (d) Waves

Ans. (a) Ground water

2. Which one of the following best describes the term "Stalactite"?
- (a) An icicle shaped formation that hangs from ceiling of a cave
 - (b) Rise up from the floor of caves
 - (c) Broad at free ends and taper towards bases
 - (d) May take the shape of a column, disc or rounded bulging end.

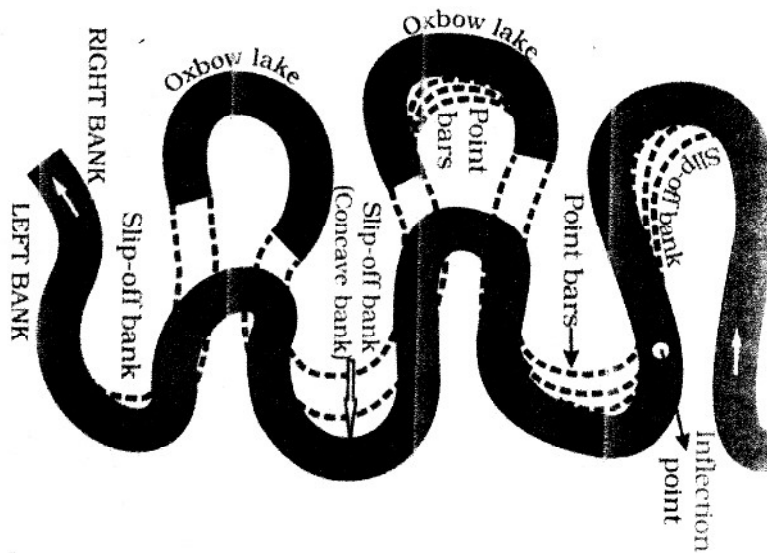
Ans. (a) An icicle shaped formation that hangs from ceiling of a cave

3. Which of the following is the chief chemical in limestone?

- (a) Calcium chloride
- (b) Calcium carbonate
- (c) Calcium hydride
- (d) Calcium phosphate

Ans. (b) Calcium carbonate

Q. II. Study the given diagram and answer the following questions.



1. Loop like channel pattern called meanders develop over _____?

- (a) Valley sides
- (b) Flood plain & valley sides
- (c) Deeta plain
- (d) Delta and flood plain

Ans. (d) Delta and flood plain

2. If there is no deposition and no erosion, the tendency to meander is _____.

- (a) Enlarge
- (b) Put up
- (c) Reduced
- (d) Stable

Ans. (c) Reduced

3. Ox bow lakes are formed due to _____.

- (a) Flooding
- (b) Wave erosion
- (c) Intense meandering
- (d) None of these

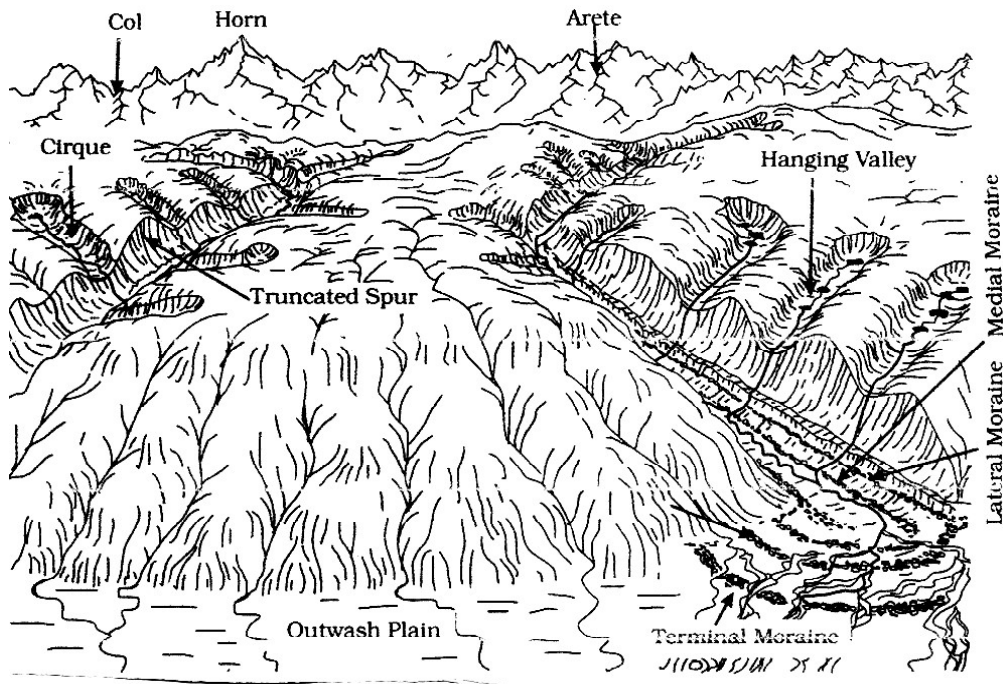
Ans. (c) Intense meandering

4. Point bars are deposited _____.

- (a) On the outside of a meander bend
- (b) At the base of waterfall
- (c) On the inside of meander bend
- (d) By turbidity currents.

Ans. (c) On the inside of meander bend

Q. III. Study the given diagram and answer the following questions.



1. Why erosion by glaciers is tremendous?
 - (a) It is the fastest geomorphic agent.
 - (b) Friction caused by sheer weight of ice
 - (c) Movement of glaciers is fast like water flow
 - (d) It carry various type of debris.

Ans. (b) Friction caused by sheer weight of ice

2. Which of the following is not erosional landform made by glaciers?
 - (a) Horn
 - (b) Cirque
 - (c) Drumlins
 - (d) Hanging valley

Ans. (c) Drumlins

3. Often cirques are found at which part of glacial valley?

- (a) Middle
- (b) Foot
- (c) Heads
- (d) Lower part

Ans. (c) Heads

Short Answer Questions

Q.1. Explain the reasons for the formation of meanders.

Ans. (i) Propensity of water flowing over very gentle gradients to work laterally on the banks.

(ii) Unconsolidated nature of alluvial deposits making up the banks with many irregularities which exert pressure laterally.

(iii) Coriolis force acting on the fluid water deflecting it like it deflects the wind.

Q.2. Describe the process of delta formation.

Ans. (i) The load carried by the rivers is dumped & spread into sea.

(ii) If the load is not carried away far into the sea or distributed along the coast, it spreads and accumulates as a low cone.

(iii) The deposits making up deltas are very well sorted with clear stratification. The coarsest materials settle out first and the finer fractions like silts and clay are carried out into the sea.

Q.3. How do waterfall and rapids form?

Ans. **Water fall**– When the river water fall down from a sufficient height along the course of the river, its forms water fall. Hard and soft rocks are found at several places in the course of the river. The soft rocks

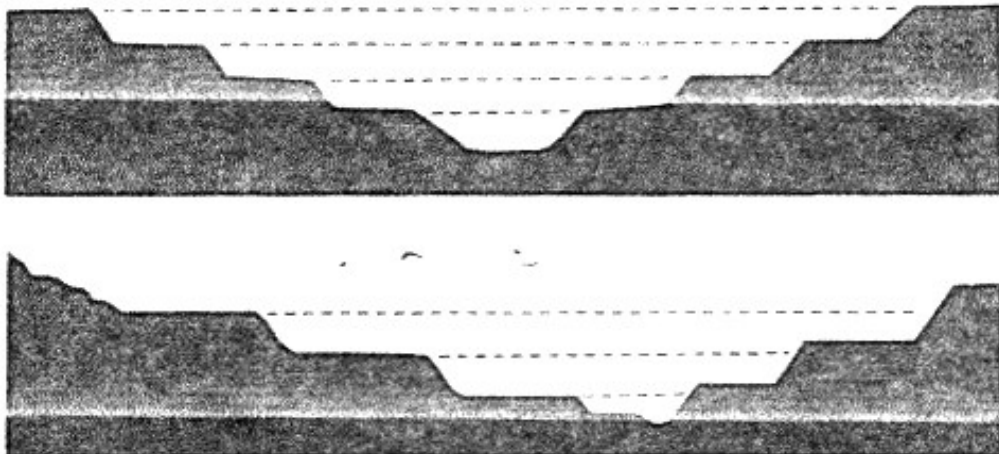
are eroded easily and quickly and the river bed is lower at the place of soft rock. Thus, the water falls from a height and water fall is created.

Rapids– The areas of shallow and fast flowing water in the river course with many standing hard rocks above water surface are called rapids. This happens due to differential erosion in which soft rocks are eroded rapidly than hard rocks.

Q.4. What are paired and unpaired terraces? Explain with diagram.

Ans. River terraces are surfaces marking old valley or flood plain levels. River terraces are products of vertical erosion in flood plain. There can be a number of such terraces at different heights indicating former river bed levels.

The river terraces may occur at the same elevation on either side of the rivers in which case they are called paired terraces.



When a terrace is present only on one the side of the stream and with none on the other side or one at quite a different elevation on the other side, the terraces are called non paired/unpaired terraces.

Q.5. Give reasons for the formation of terraces?

Ans. The terraces result due to–

- (i) Receding water after a peak flow.
- (ii) Change in hydrological regime due to climate changes.
- (iii) Tectonic up lift of land
- (iv) Sea level changes in case of river closer to the sea.

Q.6. Explain the process of mushroom formation.

Ans. Many rock out crops in the desert easily susceptible to wind deflation and abrasion are worn out quickly leaving some remnants of resistant rock polished beautifully in the shape of mushroom with slender stalk & a broad and rounded pear shaped cap above.

Q.7. Discuss the main features associated with playas Lakes.

- Ans. (i) They are nearly level plain in desert areas surrounded by hills around and along.
- (ii) They are covered up by shallow water body when there is availability of water. Such type of shallow lakes are called "Playas".
- (iii) The playa plain when covered up by salts are called "alkali flats".

Q.8. What are different type of moraines?

Ans. Moraines are long ridges of deposits of glacial till. There types are following:

- (i) Terminal moraines-Ridges of debris at the end of the glaciers.
- (ii) Lateral moraines-On either side of a glacial valley.

- (iii) Medial moraines-In the centre of a glacial valley, flanked by lateral moraines.
- (iv) Ground moraines-Irregular sheet of till over valley floor.

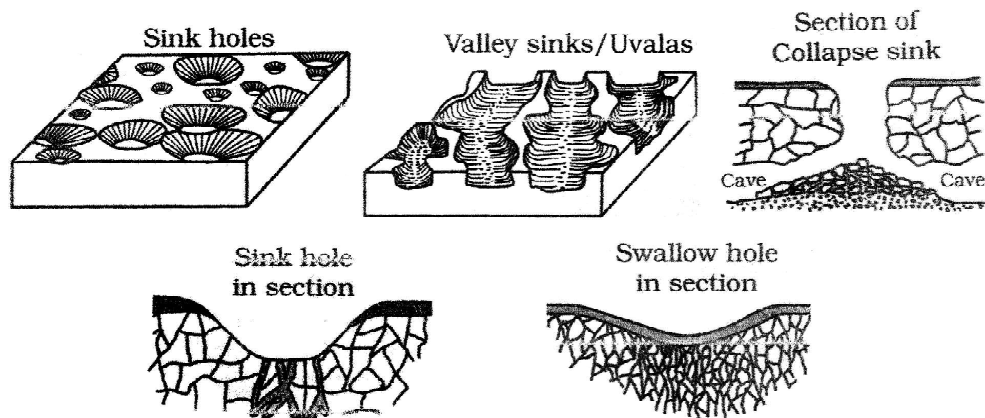
Long Answer Questions.

Q.1. Underground water forms many landforms through chemical process as erosional agent. Justify the statement.

Or

Describe the different erosional landforms found in karst regions.

- Ans.
- (i) **Sink holes:** Sink hole is a funnel shaped depression with circular at the top. They have an average depth of three to nine metres.
 - (ii) **Swallow holes:** They lie underneath the sinkhole at some depth. They form on the surface of limestones through solution.
 - (iii) **Lapies:** Gradually, most of the surface of the limestone is eaten away by pits and trenches, leaving extremely irregular with a maze of points, grooves and ridges or lapies. These lapies form due to differential solution activity along parallel to sub-parallel joints.
 - (iv) **Doline:** When a sink hole is enlarged due to solution of the rock by underground water, it becomes, a doline
 - (v) **Uvalas:** The walls of adjacent dolines collapse due to solution by underground water and they convert from long narrow into a bigger hole known as uvala. They are bigger in size than dolines.



Q.2. Explain or describe deflation hollows and caves erosional landform of wind.

Ans. Weathered mantle from over the rocks or bare soil, gets blown out by persistent movement of wind currents in one direction. This process may create shallow depressions called deflation hollows. Deflation creates numerous small pits or cavities over rock surfaces. The rock faces suffer impact and abrasion of wind borne sand and first shallow depressions called blow outs are created, & some of the blow outs become deeper and wider fit to be called caves.

Lesson – 8

Composition and Structure of Atmosphere

Objective/Multiple Type Questions

Q.1. Which of the following atmospheric layer reflects radio waves?

- (a) Exosphere
- (b) Ionosphere
- (c) Stratosphere
- (d) Troposphere

Ans. (b) Ionosphere

Q.2. The layer of the atmosphere which contains dust particles and water vapor is called _____

- (a) Stratosphere
- (b) Troposphere
- (c) Ionosphere
- (d) Mesosphere

Ans. (b) Troposphere

Q.3. Tropopause separates which of the following?

- (a) Troposphere and ozonosphere
- (b) Stratosphere and Troposphere
- (c) Stratosphere and Ionosphere
- (d) Troposphere and Ionosphere

Ans. (b) Stratosphere and Troposphere

Q.4. Which layer of atmosphere is vital for telecommunications?

- (a) Troposphere (b) Thermosphere
(c) Stratosphere (d) Ionosphere

Ans. (d) Ionosphere

Q.5. Arrange the correct sequence of different layers of the atmosphere from the surface of the Earth to upwards.

- (a) Troposphere, Stratosphere, Ionosphere, Mesosphere
(b) Stratosphere, Troposphere, Ionosphere, Mesosphere
(c) Troposphere, Stratosphere, Mesosphere, Ionosphere
(d) Stratosphere, Troposphere, Mesosphere, Ionosphere

Ans. (c) Troposphere, Stratosphere, Mesosphere, Ionosphere

Q.6. Match the following

Column I (Agent)

Column II (Landform)

- | | |
|---------------------------------------|-----------------|
| A. Temperature falls with height | 1. Ionosphere |
| B. Reflects radio waves back to earth | 2. Stratosphere |
| C. Contains most of ozone | 3. Tropopause |
| D. Fall in temperature gradient | 4. Troposphere |

- (a) A-4, B-2, C-1, D-3
(b) A-3, B-2, C-4, D-1
(c) A-4, B-1, C-2, D-3
(d) A-4, B-3, C-1, D-2

Ans. (c) A-4, B-1, C-2, D-3

Q.7. Which of the following gas absorbs the ultra-violet rays radiating from the sun?

- (a) Carbondianide
- (b) Ozone
- (c) Nitrogen
- (d) Oxygen

Ans. (b) Ozone

Q.8. Which of the following gas is transparent to the incoming solar radiation but opaque to the outgoing terrestrial radiation?

- (a) Nitrogen
- (b) Neon
- (c) Oxygen
- (d) Carbondioxide

Ans. (d) Carbondioxide

Q.9. Sea salt, pollen, ash, smoke-soot these are assoicated with which of the following.

- (a) Gases
- (b) Water vapor
- (c) Dust particles
- (d) Meteors

Ans. (c) Dust particles

Q.10. Which of the following layer is important for biological activity?

- (a) Tropopause
- (b) Troposphere
- (c) Stratosphere
- (d) Ionsphere

Ans. (d) Troposphere

Q.11. The higher concentration of dust particles found in which of the following regions?

- (a) polar region
- (b) equatorial

(c) Subtropical and temperate regions

(d) Polar and equatorial regions

Ans. (c) Subtropical and temperate regions

Q.12. Why thickness of the troposphere is greatest at the equator?

(a) Most important layer for biological activity

(b) Heat is transported to great heights by convectional currents

(c) The temperature is nearly constant

(d) It contains ozone layer.

Ans. (b) Heat is transported to great heights by convectional currents

Short Answer Questions

Q.1. "The Atmosphere is composed of many gases." Justify the statement.

or

Highlight the features of atmospheric gases.

Ans. (i) The proportion of gases changes in the higher layers of the atmosphere.

(ii) Atmosphere contains life giving gases like oxygen for humans and animals and carbon dioxide for plants.

(iii) Carbon dioxide absorbs a part of terrestrial radiation and is largely responsible for green house effect.

(iv) Ozone gas is found between 10 to 50 km above the earth's surface and acts as a filter and absorbs ultra-violet rays.

Q.2. Briefly describe the composition of atmosphere.

Ans. Atmosphere is composed of gases, water vapor and dust particles.

Gases : There are several gases in the atmosphere of which nitrogen (78.08%) and oxygen (21%) constitute the major portion. Next to this carbon dioxide, Argon and Ozone are important gases. All gases have their importance.

Water vapor : The amount of water vapor depends on the climate of the place. It absorbs parts of the insolation from the sun and preserves the earth's radiated heat. It thus allows the earth neither to become too cold nor too hot.

Dust particles : Dust particles act as hygroscopic nuclei and help in producing clouds due to condensation.

Q.3. What is the importance of dust particles in atmosphere?

or

Describe the importance of dust particles in atmosphere.

- Ans. (i) Dust particles blow in atmosphere due to wind speed. They are derived from different sources and include sea salts, fine soil, smoke soot, ash, pollen, dust and disintegrated particles of meteors.
- (ii) Dust particles help in cloud formation which causes rainfall.
- (iii) They also intercept and reflect insolation.
- (iv) They scatter solar radiation and produce charming orange and red colour at dawn and dusk. The Blue colour of Sky is also because of scattering done by dust particles.

Q.4. Why troposphere is considered an important layer of the atmosphere?

Or

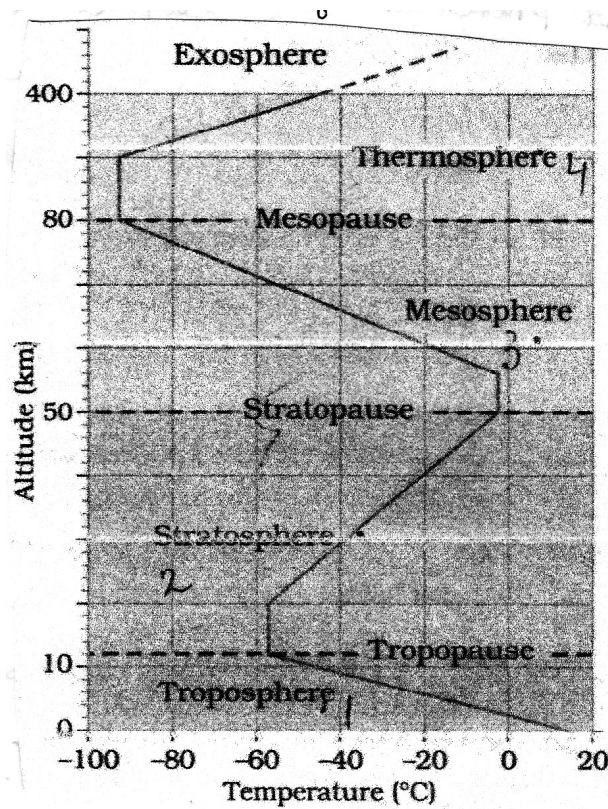
"Troposphere is important layer for biological activity." Justify

- Ans. (i) This layer contains dust particles and water vapor.
- (ii) All changes in climate and weather take place in this layer.
- (iii) Temperature decreases with altitude. So makes balance on earth.

Long Answer Questions

Q.1. Describe the structure of atmosphere with diagram.

Ans. The column of atmosphere is divided into five layers depending upon the temperature condition. On the basis of chemical composition the atmospheric layer is divided into broad layers homosphere and heterosphere. The atmospheric layers on basis of temperature condition are—



1. **Troposphere**—It is the lower most layer of the atmosphere. Its average height is 13 km. Its height is 8 km near poles and about 18 km at the equator. All changes in climate and weather take place in this layer. This is the most important layer for mankind.
2. **Stratosphere**—It extends upto a height of 50 km. The temperature remains almost constant in its lower partion upto a height of 20 km. Consequently, it is known as stratosphere. Temperature increases upto a height of 50 km and this layer contains the ozone gas which absorbs ultra violet radiation.
3. **Mesosphere**—It lies between to 50 to 80 km. In this layer, temperature starts decreasing with increase in altitude.
4. **Ionosphere**—It is located between 80 and 400 km. It contains electrically charged particles known as ions. Radio waves transmitted from the earth are reflected back to the earth by this layer.
5. **Exosphere**—The upper most layer of the atmopshere above ionosphere is exosphere. Wheaever contents are there, these are extermely rarefied in this layer and merges with outer space.

Lesson – 9

Solar radiation, Heat balance and temperature

Objective/Multiple Type Questions

Q.1. Which one of the following area received maximum insolation?

- (a) Equator
- (b) Tropical areas
- (c) Sub-tropical deserts
- (d) Poles

Ans. (c) Sub-tropical deserts

Q.2. The earth radiates energy to the atmosphere in

- (a) Long wave length
- (b) Insolation
- (c) Radiation
- (d) Short wave length

Ans. (a) Long wave length

Q.3. Which of the following is responsible for much of the transfer of heat in atmosphere?

- (a) Advection
- (b) Evaporation
- (c) Terrestrial radiation
- (d) Conduction

Ans. (c) Terrestrial radiation

Q.4. With reference to heating and cooling of earth, which of the following is true?

- (a) Lower layers of atmosphere are heated by the process of conduction.
- (b) Atmosphere is heated by shortwave radiation reflected from the surface of earth.
- (c) Transfer of heat through horizontal movement of air is called convection.
- (d) Transfer of heat through vertical movement of air is called advection.

Ans. (a) Lower of atmosphere are heated by the process of conduction.

Q.5. Which of the following is the result of advection process?

- (a) Loo winds in Northern India
- (b) Air currents
- (c) Lower layers of atmosphere get heated
- (d) Cold waves.

Ans. (a) Loo winds in Northern India

Q.6. Albedo of the earth refers to

- (a) Amount of radiation reflected by clouds
- (b) Amount of radiation reflected by earth
- (c) Amount of radiation absorbed by earth
- (d) Amount of radiation absorbed by snow

Ans. (b) Amount of radiation reflected by earth

Q.7. The minimum distance between the sun and the earth occurs on

- (a) December 21
- (b) September 21
- (c) July 4
- (d) 3 January

Ans. (d) 3 January

Q.8. When the Earth is farthest from the Sun. This position is called

- (a) Perihelion
- (b) Aphelion
- (c) Perigee
- (d) Apogee

Ans. (b) Aphelion

Q.9. Which of the following defines temperature inversion?

- (a) Air temperature increases with increasing height
- (b) Air temperature decreases with increasing height
- (c) Air temperature remains constant with increasing height
- (d) It is warmer at night than during the day

Ans. (a) Air temperature increases with increasing height

Q.10. The normal lapse rate is _____

Ans. 6.5°C per 1000 meter.

Q.11. The energy received by the earth is known as _____

Ans. insolation

Short Answer Questions

Q.1. Why is the atmosphere mainly heated by terrestrial radiation rather than insolation?

- Ans.
1. The insolation received by earth is in short waves forms and heats up its surface.
 2. The energy heats up the atmosphere from below. This process is terrestrial radiation.
 3. The long wave radiation is absorbed by the atmospheric gases particularly by carbon dioxide and the other green house gases. Thus, the atmosphere is heated mainly by terrestrial radiation.

Q.2. Which zone receives maximum heat and why?

Ans. Subtropical deserts receive maximum heat because

- (i) Cloudiness is least here.
- (ii) In winter, the middle and higher latitudes receive less radiation than in summer.

Q.3. There are different ways of heating and cooling of the atmosphere. Describe any 3 ways.

Or

Differentiate between advection and convection.

Ans. There are different ways of heating and cooling of the atmosphere.

1. **Conduction**—Conduction takes place when two bodies of unequal temperature are in contact with one another, there is a flow of energy from the warmer to cooler body. The transfer of heat continues until both the bodies attain the same temperature or the contact is broken. Lower layers of atmosphere are heated

in this way.

2. Convection—The air in contact with the earth rises vertically on heating in the form of currents and further transmits the heat of the atmosphere. This process of vertical heating of the atmosphere is known as convection.

3. Advection—The transfer of heat through horizontal movement of air is called advection. Horizontal movement of the air is relatively more important than the vertical movement. In middle latitudes, most of diurnal variation in daily weather are caused by advection alone.

Q.4. What are the effects of ocean on temperature in Southern hemisphere?

- Ans. (i) Isotherms are more or less parallel to the latitudes.
- (ii) The variation in temperature is more gradual than in the northern hemisphere.
- (iii) The isotherms of 20°C, 10°C and 0°C runs parallel to 35°S, 45°S and 60°S latitudes respectively.

Q.5. Describe the factors that cause variations in insolation?

- Ans. (i) The rotation of earth on its axis
- (ii) The angle of inclination of the sun's rays.
- (iii) The length of the day.
- (iv) The transparency of the atmosphere.
- (v) The configuration of land in terms of its aspect.

Long Answer Questions

Q.1. Describe the factors affecting distribution of temperature on the Earth?

Ans. (i) **The latitude**—The temperature of a place depends on the insolation received. The insolation varies according to the latitude hence the temperature also varies accordingly.

(ii) **The altitude**—The atmosphere is indirectly heated by terrestrial radiation from below. Therefore, the place near the sea level record higher temperature than the places situated at higher elevations.

(iii) **Distance from the sea**—Compared to land, the sea gets heated slowly and loses heat slowly. Land heats up and cools down quickly. Therefore the variation in temperature over the sea is less compared to land. Therefore, places near sea have moderate climate.

(iv) **Air mass and ocean currents**—Like the land and sea breezes, the passage of air masses also affects the temperature. The places, which come under the influence of warm air-masses experience higher temperature. The ocean currents do the same.

Q.2. What is inversion of temperature? Explain the geographical conditions for temperature inversion?

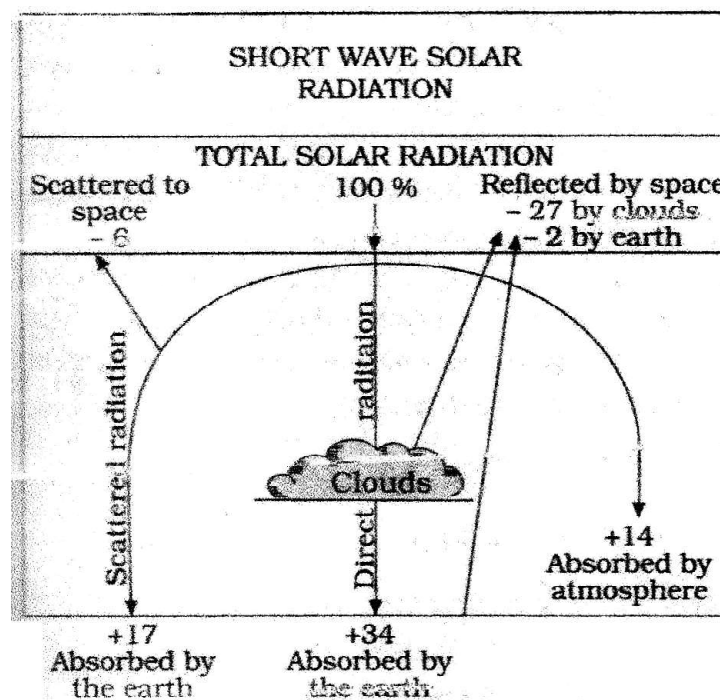
Ans. The rise of temperature with height is known as inversion of temperature. In case of inversion of temperature, the air near the earth's surface is cold while higher above it is warm. Following favour the inversion of temperature—

(i) **Long nights**—Insolation is received during day time and it is radiated during night. The earth's surface cools down at night due to radiation. The air of the lower layer touching the earth's surface is sufficiently cooled while the air of upper layer is still warm.

- (ii) **Clear sky**—The cooling of the earth by terrestrial radiation needs clear sky because cloud cover obstructs this out going radiation and hampers the occurrence of inversion of temperature.
- (iii) **Stable weather**—Continuous radiation of heat is possible in a stable weather. Wind movement distributes the heat and vertical mixing at lower level occurs.
- (iv) **Dry air**—Dry air near the surface does not absorb the out going radiation there by creating perfect condition for inversion.
- (v) **Ice cover**—Areas covered with ice reflect most of the heat radiation and the layer of air touching it becomes cold while the upper layer remains warm. This leads to temperature inversion.

Source Based Questions

Heat Budget



Lesson – 10

Atmospheric Circulation and Weather Systems

Objective/Multiple Type Questions

Q.1. Which of the following type of wind is "Monsoon wind".

- (a) Local wind
- (b) Seasonal wind
- (c) Planetary wind
- (d) Periodic wind

Ans. (b) Seasonal wind

Q.2. Air pressure is measured by which of the following instrument?

- (a) Thermometer
- (b) Hygrometer
- (c) Barometer
- (d) Isotherm

Ans. (c) Barometer

Q.3. Which of the following is found along 30°N and 30° South?

- (a) High pressure areas known as polar high
- (b) High pressure areas known as equatorial high
- (c) High pressure areas known as subtropical high
- (d) Low pressure areas known as subtropical low

Ans. (c) High pressure areas known as subtropical high

Q.4. What does ENSO stand for?

- (a) El-NINO Surface oscillation
- (b) El-NINO Southern oscillation
- (c) El-NINO Southern ocean
- (d) El-NINO Southern cyclone

Ans. (b) El-NINO Southern oscillation

Q.5. Which of the following ocean is related to southern oscillation?

- (a) Atlantic ocean
- (b) Indian ocean
- (c) Pacific ocean
- (d) Arctic ocean

Ans. (c) Pacific ocean

Q.6. Which of the following is known as “landfall of the cyclone” with reference to tropical cyclones?

- (a) The place where a tropical cyclone crosses the coast
- (b) get energy from condensation process in cumulo-nimbus clouds
- (c) destruction of cyclone
- (d) lack of moisture in cyclone

Ans. (a) The place where a tropical cyclone crosses the coast

Q.7. Match Item I with Item II.

Column I (Cyclone)

- A. Cyclone
- B. Hurricane

Column II (Place)

- 1. Atlantic ocean
- 2. Australia

- C. Typhoon
D. Willy willies
3. Indian ocean
4. South china sea
- (a) A-1 B-3 C-4 D-2
(c) A-3 B-1 C-4 D-2
- (b) A-3 B-1 C-2 D-4
(d) A-3 B-4 C-2 D-1

Ans. (c) A-3 B-1 C-4 D-2

Q.8. At the equator, coriolis force is _____

- (a) maximum
(c) zero
- (b) minimum
(d) highest

Ans. (c) zero

Q.9. Water spouts is related with?

- (a) Hurricane
(c) Cyclone
- (b) Tornado
(d) Depression

Ans. (b) Tornado

Q.10. Identify the ideal temperaure required for tropical cyclone?

- (a) 24°C
(c) below 20°C
- (b) More than 27°C
(d) More than 30°C

Ans. (b) More than 27°C

Q.11. Which wind flows in ferrel cell?

- (a) Westerlies
(c) Trade winds
- (b) Polar esterlies
(d) Polar westerlies

Ans. (a) Westerlies

Short Answer Questions

Q.1. Coriolis force affects directions of wind. Explain.

Or

How coriolis force affects the direction of wind? Justify.

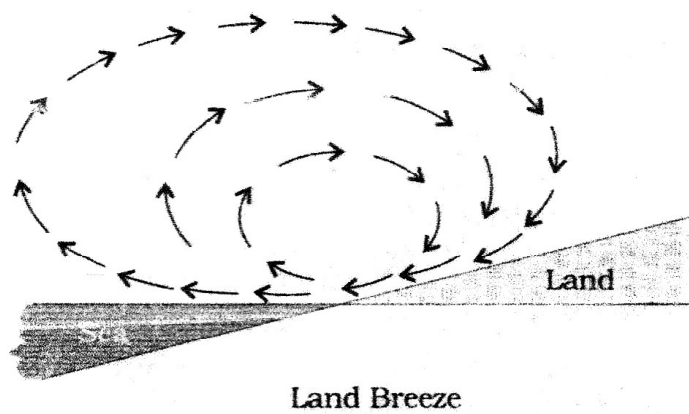
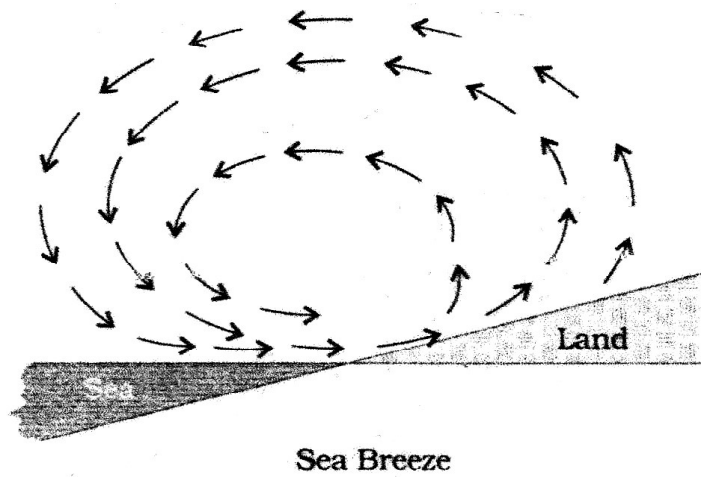
Ans. The earth's rotation about its axis creates a force which affects the direction of winds in both hemispheres. This is called coriolis force.

- Coriolis force deflects the wind to right direction in the northern hemisphere and left in the southern hemisphere.
- It is maximum at the poles and is absent at the equator.
- The coriolis force is directly proportional to the angle of latitude.

Q.2. Differentiate between land and sea Breeze.

Ans. **Land Breeze**—At night, land becomes cooler than sea due to rapid radiation. This results in high pressure over the land and low pressure over the sea. Wind starts blowing from land to sea and it is known as land breeze.

Sea Breeze—During day time when the sun shines, land gets more heated than the adjoining sea and develops low pressure. The adjoining sea is still cooler and develops a comparatively high pressure. Cool breeze called sea breeze starts blowing from high pressure area of sea to low pressure area of land.

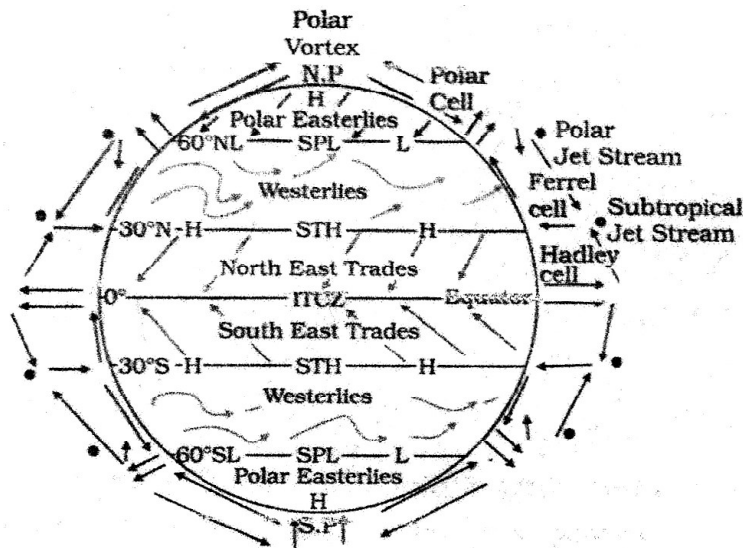


Q.3. Explain the different type of winds

Ans. There are three type of winds

- (i) **Planetary winds**—These are also known as permanent or prevailing winds. Planetary winds blow over vast areas of continents and oceans throughout the year in a particular

direction. They blow regularly from high pressure belts to low pressure belts. Planetary winds are divided into three categories according to pressure belts as trade winds, westerlies and polar winds.



: Simplified general circulation of the atmosphere

- (ii) **Seasonal Winds**—The winds which change their direction with the change in season are known as seasonal or periodic winds. Example—Monsoon winds.
- (iii) **Local Winds**—These winds are caused by differential heating and cooling of the earth's surface and affect local areas. Example—Loo, foehn and Mistral.

Q.4. Differentiate between Mountain and Valley Breeze?

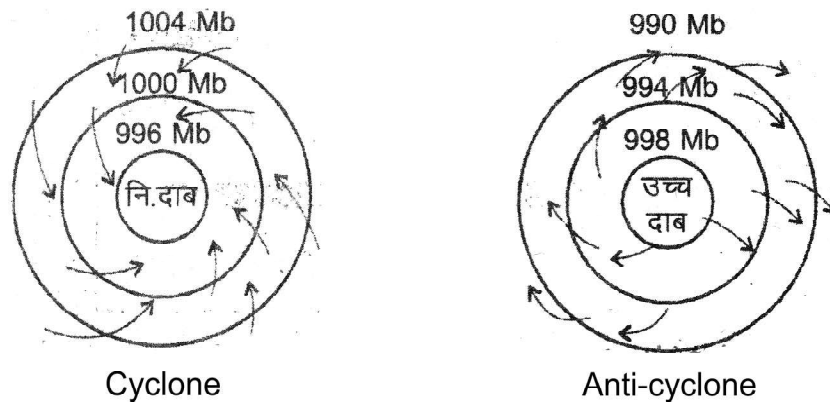
Ans. **Valley Breeze**—During day, the mountain slope is heated more than the valley floor. The air from the valley blows up the slope in the form of valley breeze.

Mountain Breeze—Rapid loss of heat through terrestrial readiation along the mountain slopes results in sliding of cold dense air from higher elevation to valleys. This is called mountain breeze.

Q.5. Differentiate between Cyclone and Anticyclone.

Ans. **Cyclone**—A cyclone is a low pressure area surrounded by high pressure areas from all sides. It is circular or elliptical in shape. Winds move from all sides to the central low. They assume anticlockwise direction in the Northern hemisphere and clockwise direction in the Southern hemisphere due to coriolis effect.

Anticyclone—An anti cyclone is a high pressure area surrounded by low pressure areas from all sides. Winds move to all sides from centre. They assume clockwise direction in the northern hemisphere and anticlockwise direction in the southern hemisphere due to coriolis effect.



Q.6. Explain the conditions favourable for the formation of tropical storm?

- Ans. (i) Large sea surface with temperature higher than 27°C.
(ii) Presence of the coriolis force.
(iii) Small variations in the vertical wind speed.

- (iv) A pre existing weak low pressure area or low level cyclonic circulation.
- (v) Upper divergence above the sea level system.

Q.7. What are the factors on which pattern of planetary winds depends?

- Ans.
- (i) Latitudinal variation of atmospheric heating.
 - (ii) Emergence of pressure belts.
 - (iii) The migration of belts following apparent path of the sun.
 - (iv) The distribution of continents and oceans.
 - (v) The rotation of earth.

The pattern of the movement of the planetary winds is called the general circulation of the atmosphere.

Q.8. What are the names of the tropical cyclones in different regions?

- Ans.
- (i) "Cyclones" in the Indian ocean.
 - (ii) "Hurricanes" in the Atlantic ocean
 - (iii) "Typhoons" in western pacific and china
 - (iv) "Willy-willies" in West Australia

Long Answer Questions

Q.1. Explain the horizontal distribution of Air pressure of the world?

Ans. The distribution of atmospheric pressure across the latitudes is known as horizontal distribution of atmospheric pressure. There are seven pressure belts over the globe along certain specific latitudes. They

are as follows :

(i) Equatorial low pressure belts—

- This is a low pressure belt which extends up to 5°N and 5° South of equator.
- Due to intense heating, air gets warm and rises over the equatorial region and produces the equatorial low pressure belt.
- There is extremely low pressure with calm conditions in this belt. Surface winds are generally absent since winds approaching this belt begun to rise near its margin. Thus, only vertical currents are found.

(ii) Sub Tropical High Pressure Belts

- Found between 30° and 35° in Both hemispheres.
- Winds descends in these belts making it a high pressure area.
- Calm wind conditions with feeble and variable winds.
- Presence of hot deserts on western margins of continents.

(iii) Sub-Polar low pressure Belts—The sub polar lows are located between 60° to 60° in both hemispheres. Cyclones occurs in this belt, in winter.

(iv) Polar High Pressure belts—From 80°N & S to N & S poles, There exist high pressure belt known as polar high pressure belts.

These high pressure belts are caused by extremely low temperature at the poles which remain below freezing point even during the summer season.

Q.2. Explain the factors affecting the velocity and direction of winds?

Ans. The air is set in motion due to the differences in atmospheric pressure. The horizontal winds near the earth surface respond to combine affects of three forces—

- (i) **Pressure Gradient**—The rate of change of pressure with respect to distance is the pressure gradient. The pressure gradient is strong where the isobars are close to each other and is weak where the isobars are far away from one another.
- (ii) **Frictional Force**—It is greatest at the surface and its influence generally extends up to an elevation of 1 to 3 km. Over the sea surface the friction is minimal.
- (iii) **Coriolis Force**—This force deflects the wind to the right direction in the northern hemisphere and to the left in the southern hemisphere. The coriolis force is directly proportional to the angle of latitude. It is maximum at the poles and is absent at the equator.

Q.3. “The extra tropical cyclone differs from the tropical cyclone in number of ways.” Analyse it.

- Ans.
- (i) The extra tropical cyclones have a clear frontal system which is not present in the tropical cyclones.
 - (ii) They cover a larger area and can originate over the land and sea. Whereas the tropical cyclones originate only over the seas and on reaching the land they dissipate.
 - (iii) The extra tropical cyclone affects a much larger area as compared to the tropical cyclone.
 - (iv) The wind velocity in a tropical cyclone is much higher and it is more destructive.

- (v) The extra tropical cyclones move from West to East but tropical cyclones, move from East to West.

Q.4. What are Fronts? Describe the different type of fronts.

Ans. The "boundary zone" of two different airmasses is called a Front. They are of following types.

- (i) Cold front - when the cold air moves towards the warm airmass and up lift it. It is called cold front
- (ii) Warm front- When warm air mass move towards the cold front.
- (iii) Occluded- When an airmass is fully lifted.
- (iv) Stationary- When the fronts remain stationary.

Conclusion- Fronts occur in middle latitudes and are known for steep gradient in temperature and pressure.

Lesson – 11

Water in atmosphere

Objective/Multiple Type Questions

Q.1. What are the ideal conditions for dew formation?

- (a) Calm air, short and hot nights.
- (b) Clam air, clouded sky.
- (c) Stormy wind, short night.
- (d) Clam air, cold and long nights.

Ans. (d) Clam air, cold and long nights.

Q.2. The transformation of water vapor into water is called _____

- (a) Evaporation
- (b) Condensation
- (c) Precipitation
- (d) Saturation

Ans. (b) Condensation

Q.3. The ability of the air to hold water vapor depends entirely on _____ .

- (a) Air pressure
- (b) Humidity
- (c) Temperature
- (d) Dew point

Ans. (c) Temperature

Q.4. Which of the following is true about relative humidity?

- (a) It is least over the continents.
- (b) It is greater over the continents.
- (c) It is least over the oceans
- (d) It is equal over oceans and continents.

Ans. (a) It is least over the continents.

Q.5. Which of the following statement does not describe the feature of convectional rainfall?

- (a) With thunder and lightening heavy rainfall takes place.
- (b) It is common on the part of day.
- (c) Cirrus clouds are formed.
- (d) Cumulous clouds are formed.

Ans. (c) Cirrus clouds are formed

Q.6. Relative humidity is measured in which unit?

- (a) Kilogram
- (b) Percentage
- (c) Milibar
- (d) Meter

Ans. (b) Percentage

Q.7. Dew point is

- (a) Percentage
- (b) Cube
- (c) Temperature
- (d) Gram

Ans. (c) Temperature

Q.8. Which area receives maximum conventional rainfall?

- (a) Polar Region
- (b) Equatorial Region
- (c) Oceans
- (d) Oceans in polar Region

Ans. (b) Equatorial Region

Q.9. Why do western margins of the continents between 45° and 65°N and S of equator receives rainfall firstly?

- (a) Due to shadow zone
- (b) Due to westerlies
- (c) Due to easterlies
- (d) Due to wind ward slope

Ans. (b) Due to westerlies

Q.10. The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as—

- (a) Specific humidity
- (b) Absolute humidity
- (c) Relative humidity
- (d) Saturated air

Ans. (c) Relative humidity

Q.11. Orographic rainfall is more on—

- (a) Plains
- (b) Nalleys
- (c) Wind ward slopes
- (d) Leeward Slopes

Ans. (c) Wind ward slopes

Short Answer Questions

Q.1. How clouds are formed?

Ans. Clouds are formed by the condensation of water vapor around nuclei

minute dust particles in the air. In most cases, clouds consist of tiny droplets of water, but they may also consist of ice particles if the temperature is below freezing point.

Q.2. What is Evaporation? Explain the factors affecting Evaporation.

Ans. Evaporation is a process by which water is transformed from liquid to gaseous state. Approximately 600 calories of energy is required to convert one gram of water into water vapor without any change in the temperature. Heat stored in the water vapor is known as latent heat. Temperature, Dryness of air, size of water, area & movement of air affects evaporation.

Q.3. What is Humidity? Explain the types of humidity.

Ans. The amount of water vapor present in the air is called humidity. It is measured in cubic meter/gm. At any specific temperature, the quantity of moisture that can be held by the air has a definite limit. This limit is known as saturation point. Types of humidity are—

- (i) **Absolute humidity**—The weight of actual amount of water vapor present in a unit volume of air is called the absolute humidity. It is usually expressed as grams per cubic metre of air.
- (ii) **Specific humidity**—It is the weight of water vapor per unit weight of air. Since it is measured in units of weight (usually grams per kilogram), specific humidity is not affected by changes in pressure or temperature.
- (iii) **Relative humidity**—It is the ratio of water vapor present in the air at a particular temperature to the amount of water vapor required to saturate the same air at the same temperature. It is always expressed in percentages. It is important for the weather forecast.

Q.4. What is Dew? Explain the favourable conditions for the formation of Dew.

Ans. Earth's surface is heated during day time and it cools down at night. Some times the cooling is so much that the temperature of the air touching earth's surface falls below dew points. Water vapor present in the air condenses and is deposited in the form of droplets on cooler surface of solid objects such as stones, grass blades and plant leaves. This is known as Dew.

Following are the conditions for dew formation—

- (i) Long nights
- (ii) Clear sky
- (iii) Calm Air
- (iv) High relative humidity.
- (v) Dew point should be higher than freezing point.

Q.5. What is Frost?

Ans. Frost forms on cold surfaces when condensation takes place below freezing point (0°C) i.e. the dew point is at or below the freezing point.

Q.6. Differentiate between evaporation and condensation.

Ans. **Evaporation:** (i) Evaporation is a process by which water is transformed from liquid to gaseous state.

(ii) Heat is the main cause of evaporation.

Condensation: (i) The transformation of water vapor into water is called condensation.

(ii) Condensation is caused by the loss of heat.

Long Answer Questions

Q.1. How rainfall occurs? Explain the types of rainfall.

Ans. When the humid air rises up, it cools and condensation of water vapor takes place. The water vapor is deposited on hygroscopic particles and turned into water particles. These are known as cloud particles. The cloud particles float in the air and clouds are formed. If these particles come close to one another, they may coalesce into bigger particles. When their size becomes so large that their weight is more than the upthrust of air, the particles will fall down in the form of rain.

Types of Rainfall

(i) **Convective Rainfall**—When the earth's surface is heated up, the air touching it is also heated. On being heated, it expands and becomes lighter. Consequently, it rises to great heights and convection currents are formed. When the moist air cools at sufficient height, condensation of the water vapor takes place and convective rainfall occurs. It occurs almost daily in the equatorial region.

(ii) **Orographic Rainfall**—When humid air is forced to rise along the slope of a mountain or a plateau, cooling is caused and it gets saturated. Clouds are formed due to condensation and rainfall occurs. This is called orographic rainfall.

(iii) **Cyclonic Rainfall**—Rainfall associated with a cyclone is known as cyclonic or frontal rainfall.

Q.2. "On the basis of total amount of annual precipitation, major precipitation regimes of the world are identified." Examine the statement.

- Ans. (i) The equatorial belt, the wind ward slopes of the mountain along the western coasts in the cool temperate zone receives heavy rainfall.
- (ii) Coastal areas of monsoon land receive heavy rainfall over 200 cm per annum.
- (iii) Interior continental areas receive moderate rainfall.
- (iv) The coastal areas of the continents receive moderate amount of rainfall.
- (v) The central parts of the tropical land and the eastern and interior parts of the temperate land receive rainfall varying between 50-100 cm per annum.
- (vi) Areas lying in the rain shadow zone of the interior of the continent and high latitudes receive very less rainfall.

Q.3. Classify the clouds according to their height, expanse, density and transparency?

- Ans. (i) **Cirrus**—They formed at high altitudes (8000 – 12000 m). They are thin and detached clouds having a feathery appearance. They are always white in color.
- (ii) **Cumulus**—Cumulus clouds look like cotton wool. They are generally formed at a height of 4000 – 7000 meter. They exist in patches and can be seen scattered here & there.
- (iii) **Stratus**—These are layered clouds covering large portions of the sky. These clouds are generally formed either due to loss of heat.

(iv) **Nimbus**—Nimbus clouds are black or dark gray, they form at middle levels or very near to the surface of the earth. These are extremely dense & opaque to the rays of the sun. They can be classified as—

- (i) High clouds
- (ii) Middle clouds
- (iii) low clouds
- (iv) clouds with extensive vertical development

Q.4. “Different places on the earth’s surface receive different amount of rainfall in a year.” Analyse the statement.

- Ans.
- (i) As proceeding from the equator towards the poles, rainfall goes on decreasing steadily.
 - (ii) The coastal areas of the world receive greater amounts of rainfall than the interior of the continents.
 - (iii) The rainfall is more over the oceans than on the land masses of the world because of being great sources of water.
 - (iv) Between the latitudes 35° & 40°N & South of the equator, the rain is heavier on the eastern coasts and goes on decreasing towards the west.
 - (v) Between 45° and 65° N and S of equator, due to the westerlies, the rainfall is first received on the western margins of the continents and it goes on decreasing towards the east.

Q.5. What is condensation? Mention the conditions for condensation.

Ans. Condensation is the transformation of water vapor into water.

Conditions-

- (i) When the temperature of the air is reduced to dew point with its volume remaining constant.
- (ii) When both the volume and the temperature are reduced.
- (iii) When moisture is added to the air through evaporation.
- (iv) Decrease in air temperature is the most ideal condition for condensation.

Lesson — 12

World Climate and Climate Change

Objective/Multiple Type Questions

Q.1. Which of the following is the feature of 'AW" type of climate?

- (a) No summer season
- (b) Dry winter season
- (c) Low temperature whole year
- (d) Winter with rain

Ans. (b) Dry winter season

Q.2. _____ climate occurs along the west coast of continents between 30°–40° latitudes.

- (a) Subtropical steppe
- (b) Warm temperate climate
- (c) Mediterranean climate
- (d) Tropical monsoon climate

Ans. (c) Mediterranean climate

Q.3. Cold climate with Humid winters is _____.

- (a) Df
- (b) Ef
- (c) Dw
- (d) ET

Ans. (a) Df

Q.4. Which of the following type of climate have feature of "Average temperature for all months in below 10°C"?

- (a) Cold
- (b) Dry
- (c) Cold snow forest
- (d) Warm temperate

Ans. (a) Cold Climate

Q.5. Match Column I with Column II.

Column I (Letter Code)	Column II (Feature)
A. Am	1. Winter dry and severe
B. Dw	2. No dry season, sever winter
C. Bwh	3. Winter dry season
D. Df	4. Low latitude dry.
(a) A-1 B-3 C-2 D-4	(b) A-3 B-1 C-2 D-4
(c) A-3 B-1 C-4 D-2	(d) A-1 B-3 C-4 D-2

Ans. (c) A-3 B-1 C-4 D-2

Q.6. "Cwa" types of climate is found in _____

- (a) North east Argentina
- (b) North west Europe
- (c) Amazone basin of south America
- (d) North Indian Plains

Ans. (d) North Indian Plains

Q.7. Which of the following gases has the largest concentration in Green house gases?

- (a) Carbon monoxide
- (b) Carbondioxide
- (c) Methane
- (d) CFC.

Ans. (b) Carbondioxide

Q.8. "Dry hot Summer" is related to which of the climatic group?

- (a) Cs
- (b) Cfa
- (d) Cfb
- (d) Am

Ans. (a) Cs

Q.9. Mosses and lichens are grown in which area:

- (a) North America
- (b) California
- (c) Alaska
- (d) Argentina

Ans. (c) Alaska

Q.10. _____ classification attempts to organize climates according to their causes.

- (a) Hydrological
- (b) Empirical
- (c) Genetic
- (d) None of above

Ans. (c) Genetic

Short Answer Questions

Q.1. Differentiate between Am and Aw type of climate?

Ans. (Am) Tropical monsoon climate—

- (i) This climate is dominated by monsoon winds which bring heavy rainfall in summer.
- (ii) Winter is practically dry.
- (iii) This type of climate is found in the Indian Sub-Continent, North Eastern parts of south America and Northern Australia.

Aw (Tropical wet and dry climate)

- (i) The rainfall is variable and is much less than that in Af and Am climates.
- (ii) It borders with dry climate on the western part of the continent.
- (iii) This type of climate is found in the Indian subcontinent, North Eastern parts of south America and Northern Australia.

Q.2. Describe the types of climate according to Koeppen classification.

Ans. **Climatic Types According to Koeppen**

Group	Type	Letter Code	Characteristics
A-Tropical Humid Climate	Tropical wet	Af	No dry season
	Tropical monsoon	Am	Monsoonal, short dry season
	Tropical wet and dry	Aw	Winter dry season
B-Dry Climate	Subtropical steppe	BSh	Low-latitude semi arid or dry
	Subtropical desert	BWh	Low-latitude arid or dry
	Mid-latitude desert	Bsk	Mid-Latitude semi arid or dry
	Mid-latitude desert	BWk	Mid-latitude arid or dry

C-Warm temperate (Mid-latitude) Climates	Humid subtropical	Cfa	No dry season, warm summer
	Mediterranean	Cs	Dry hot summer
	Marine west Coast	Cfb	No dry season, warm and cool summer
D-cold Snow forest Climates	Humid continental	Df	No dry season, severe winter
	Subarctic	Dw	Winter dry and very severe
E-Cold Climates	Tundra Polar ice cap	ET EF	No true summer Perennial ice
H-Highland	Highland	H	Highland with snow cover

Q.3. Differentiate between Tundra and Taiga type of Climate?

Taiga climate	Tundra climate
1. It extends in sub polar belt of North America and Eurasia.	1. It extends beyond the Arctic and Antarctic Poles.
2. The winters are long and cold.	2. The winters are very long and severe. Summers are negligible.
3. It is a belt of coniferous forest.	3. No trees found only lowest form of vegetation like mosses and lichens found.

Q.4. Change in climate is a natural and continuous process. Support the statement with evidence.

Ans. (i) Geological records show alternation of glacial and interglacial periods.

(ii) The geomorphological features exhibit traces of advancement and retreats of glaciers.

(iii) Historical records describe the vagaries in climate.

Q.5. Differentiate between empirical classification and genetic classification?

Ans. Empirical classification is based on observed data, particularly on temperature and precipitation. Genetic classification attempts to organize climates according to their causes.

Long Answer Questions

Q.1. What is global warming? Describe the effects of global warming

Ans. Global warming is the slow increase in world temperature caused by the green house effects. It is taking place due to the presence of green house gases (GHGs) in the atmosphere.

Effects of global warming are—

(i) It will affect life supporting system.

(ii) Rise in the sea level due to melting of glaciers & ice caps.

(iii) Thermal expansion of the sea may inundate large parts of coastal area and islands.

(iv) It will change the rainfall patterns, create new plant diseases and lead to enlarged ozone hole.

Q.2. Describe the causes of climate change in the world?

Ans. The causes for climate change are many. The main causes are—

- (i) **Astronomical causes**—These causes are concerned with solar output associated with sunspot activities. Sun spots are dark and cooler patches on the sun's whole size increases and decreases in a cyclic order. Decrease in the number of sunspots results in warm and drier conditions. Milankovitch oscillations infer cycles in the variations in the earth's orbital characteristics around the sun, the wobbling of the earth and the changes in the earth axial tilt.
- (ii) **Terrestrial Causes**—Among the terrestrial causes volcanism is one of the important cause of climate change. When a volcano erupts, it throws lots of aerosols into the atmosphere. These aerosols obstruct the sun's rays and reduce the amount of solar radiation reaching the earth's surface, thereby causing cool weather.
- (iii) **Anthropogenic Causes**—It may include introduction of carbon dioxide as well as some other green house gases, like methane and chlorofluoro carbon into the atmosphere.

Q.3. Differentiate between cfa and cfb type of climate.

- Ans. **cfa**—(i) Humid subtropical climate lies on the eastern parts of the continent in subtropical latitudes.
- (ii) In this region the air masses are generally unstable.
 - (iii) They occur in eastern United States of America, Southern and Eastern China, North eastern Argentina.
 - (iv) The annual averages of precipitation vary from 75-150 cm.
 - (v) Thunder storms in summer and frontal precipitation in winter are common.

- cfb—**(i) Marine west coast climate is located ward from the mediterranean climate on the west coast of continents.
- (ii) The main area are 'North western europe, west coast of North America, north of california and Newzealand.
- (iii) The temperature is moderate and in winter, it is warmer than for its latitude.
- (iv) Precipitation varies greatly from 50-250 cm.
- (v) The annual and daily ranges of temperature are small.

Source Based Question

Read the source given carefully and answer the questions that follow.

The primary GHGs of concern today are carbon dioxide (CO₂). Chlorofluorocarbons (CFCs), methane (CH₄), nitrous oxide (N₂O) and ozone (O₃). Some other gases such as nitric oxide (NO) and carbon monoxide (CO) easily react with GHGs and affect their concentration in the atmosphere.

The effectiveness of any given GHG molecule will depend on the magnitude of the increase in its concentration, its life time in the atmosphere and the wavelength of radiation that it absorbs. The chlorofluorocarbons (CFCs) ar highly effective. *Ozone* which absorbs ultra violet radiation in the stratosphere is very effective in absorbing terrestrial radiation when it is present in the lower troposphere. Another important point to be noted is that the more time the GHG molecule remains in the atmosphere, the longer it will take for earth's atmosphere system to recover from any change brought about by the latter.

The *largest concentration* of GHGs in the atmosphere is *carbon*

dioxide. The emission of CO₂ comes mainly from fossil fuel combustion (oil, gas and coal). Forests and oceans are the sinks for the carbon dioxide. Forests use CO₂ in their growth. So, deforestation due to changes in land use, also increases the concentration of CO₂. The time taken for atmospheric CO₂ to adjust to changes in sources to sinks is 20-50 years. It is rising at about 0.5 per cent annually. Doubling of concentration of CO₂ over pre-industrial level is used as an index for estimating the changes in climate in climatic models.

Chlorofluorocarbons (CFCs) are products of human activity. *Ozone* occurs in the stratosphere where ultra-violet rays convert oxygen into ozone. Thus, ultra violet rays do not reach the earth's surface. The CFCs which drift into the stratosphere destroy the ozone. Large depletion of ozone occurs over Antarctica. The depletion of ozone concentration in the stratosphere is called the ozone hole. This allows the ultra violet rays to pass through the troposphere.

Answer the following questions—

1. Which gas have largest concentration of GHGs in the atmosphere?

Ans. (d) Carbondioxide

2. In which layer of atmosphere ozone is situated?

Ans. (a) Stratopshere

3. What will be the effect of concentration of green house gases?

Ans. (b) Increase in temperature of earth

Chapter-13

Ocean water

The features found on the oceanic floor can be divided into two classes.

Major relief features	Minor relief features
The continental Shelf	Ridges
The continental Slope	Hills
The Deep sea plain	Sea mounts
The Oceanic Deeps	Guyots
	Trenches
	Canyons
	Atoll etc.

Objective Questions

Q.1. Identify the salt that is found in excess in sea water.

- | | |
|------------|--------------|
| (a) Borate | (b) Chlorine |
| (c) Sodium | (d) Sulphate |

Ans. (b) chlorine

Q.2. refers to the boundary area between surface water and deep layers of the ocean.

Ans. The Profile (temperature-depth Profile)

Q.3. Which of the following represents the average temperature of the surface water of oceans?

- (a) 27.5 degree Celsius

- (b) 28 degree Celsius
- (c) 26 degree Celsius
- (d) 27 degree Celsius

Ans. (d) 27 degree Celsius

Q.4. Which of the following canyon is a part of a relief?

- (a) The continental Slope
- (b) Atoll
- (c) Deep sea plain
- (d) Oceanic deeps

Ans. (a) The continental Slope

Q.5. Which of the following factors does not affect ocean water temperature?

- (a) Prevailing wind
- (b) Ocean currents
- (c) Salinity
- (d) Latitude

Ans. (c) Salinity

Q.6. is the shallowest part of the ocean that is formed on average slope by 1 degree or less.

Ans. Continental Shelf

Q.7. I. Assertion- The temperature of surface water decreases from the equator towards the poles.

II. Reason-The amount of insolation decreases pole ward.

Which of the following is correct.

- (a) Only I is correct
- (b) Only II is correct

- (c) Both are correct and II explains statement I correctly
- (d) Both are correct but II is not explaining I statement

Q.8. Which of the following statement is/are correct?

- I. Gulf stream raises the temperature near the western coast of Europe.
 - II. Labrador current lowers the temperature near the north-east of North America
- (a) Only I is correct (b) I and II both are correct
(c) Only II is correct (d) I & II both are incorrect

Ans. (b) I and II both are correct

Q.9. Salinity generally _____ with depth.

- (a) Decreases (b) Increase
- (c) Remain same (d) None of above

Ans. (b) Increases

Short answer questions

Q.1. What does the salinity of ocean water mean?

Ans. Salinity is the term used to define the total content of dissolved salts in seawater. it is calculated as the amount of salt in gram dissolved in 1000 gram (1kg) of seawater. it is usually expressed as parts per thousand or PPT.

Q.2. Highlight the features of Continental shelf

- Ans. • The continental shelf is the extended margin of each continent occupied by relatively shallow seas and gulfs.
- It is the shallowest part of the ocean showing an average gradient of 1° degree or even less.
 - It's depth varies from 30m to 600m
 - The shelf typically ends at a very steep slope, called the shelf break.
 - The width of the continental shelves vary from one ocean to another. The average width is about 80 km.
 - It is the source of fossil fuels.

Q.3. What is deep sea plain?

Ans. Deep sea plains are gently sloping areas of the ocean basins. These are the flattest and smoothest regions of the world. The depths vary between 3,000 and 6,000m. These plains are covered with fine-grained sediments like clay and silt.

Q.4. How is seamount different from Guyots?

Ans. Seamount is a mountain with pointed summits rising from the sea floor that doesn't reach the surface of the ocean while Guyots is a flat topped seamount and show the evidence of gradual subsidence through stages to become flat topped submerged mountains.

Q.5. What are submarine Canyons?

Ans. These are deep valleys, some comparable to the Grand Canyon of the Colorado river. They are sometimes found cutting across the

continental shelves and slopes, often extending from the mouths of large rivers. The Hudson Canyon is the best known canyon in the world.

Q.6. Explain the main features of continental slope?

- Ans. • The continental slope connects the continental shelf and the ocean basins.
- The gradient of the slope region varies between 2-5 degrees.
 - The depth of the slope region varies between 200 and 3,000 m.
 - The slope boundary indicates the end of the continents.
 - Canyons and trenches are observed in this region.

Q.7. Explain any three features of Atoll.

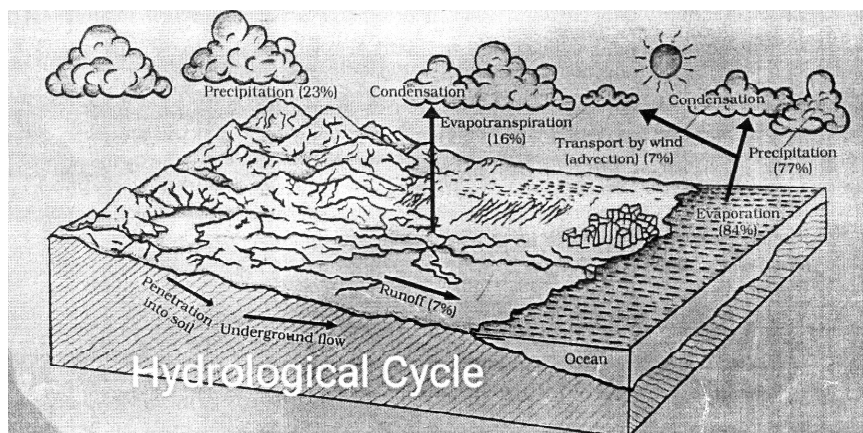
- Ans. (i) These are low islands found in the tropical oceans consisting of coral reefs surrounding a central depression.
- (ii) It may be a part of sea.
- (iii) It may form enclosing a body of fresh, brackish or highly saline water.

Long answer questions

Q.1. Explain the water cycle.

Ans. Water cycle is a cycle working on earth for millions of years. In this, water changes its position and location continuously and reaches the surface of the ocean in the form of a cycle and from the ground back to the ocean. Water evaporates from the bottom of the oceans, forming clouds. The water vapour in the atmosphere condenses and comes to the Earth as precipitation. This water reaches back into the ocean via rivers. This cycle of water is called the water cycle. In this way, the

water cycle keeps the terrain, the water system and the atmosphere connected to each other.



Q.2. What factors affect the salinity of ocean water.

Ans. Different amounts of salinity are found at different places. Factors affecting it are:-

1. Water supply: Low salinity in cold water compared to hot water it occurs. Salinity is reduced at the estuaries of rivers.
2. The amount of evaporation: less at the poles and higher latitudes, while more evaporation occurs at Cancer and Capricorn circles. Where evaporation is high salinity will be high.
3. Ocean currents: Salinity is less in cold streams and more in hot streams.

Q.3. "Salinity of oceans ranges differently". Justify the statement.

Horizontal distribution of salinity

The distribution of salinity in the water of different seas of the world is of a different type, it can be described as follows:

Salinity of open seas

1. The amount of salinity is highest on Cancer and Capricorn (Due to excess of evaporation).
2. The amount of salinity near the equator is less because of the excess rainfall.
3. Low salinity levels are found near the poles, (due to ice joining the sea).

Q.4. Explain the factors affecting the temperature distribution of oceans?

Ans. Like all other objects on the earth, ocean water receives heat from the sun. Sea water is heated by receiving heat from solar radiation which increases its temperature. The temperature of seawater is not always the same. It varies according to time and place.

The following factors affect the temperature:

1. Latitude
2. Prevailing Winds
3. Ocean Currents
4. Effect of Adjacent Land Masses
5. Salinity
6. Ice Flows and Icebergs

Q.5. Which layers of temperature will you face when going down to sea?
Why does temperature vary with depth?

Ans. The sea contains thousands of types of fauna and other elements

which are affected by the sea temperature, as the depth of the ocean and the sea increases the temperature varies. The following layers are encountered when we go down in sea or ocean

First Layer- It represents the top layer of warm oceanic water and it is about 500m thick with temperature ranging between 20 degree and 25 degree Celsius.

Second Layer- This is called **thermocline** layer lies below the first layer and is characterised by rapid decrease in temperature with increasing depth. The temperature decreases at a rapid rate as its depth increases. Its thickness varies from 500-1000 m.

Third Layer: This layer is very cold and extends up to the deep ocean floor, in the Arctic and Antarctic circles the surface water temperatures are close to zero degree Celsius and so the temperature change with the depth is very slight. In such regions only one layer of cold water exists.

Q.6. What is the difference between temperature gradient (thermocline) and salinity gradient (halocline)?

Ans. The temperature gradient and salinity gradient represent the level at which temperature and salinity rapidly decline or increase, respectively. Both these layers are found in the sea at a depth of 500-1000 meters.

The temperature gradient layer shows a rapidly falling temperature while the salinity gradient shows a rapidly increasing salinity. Both temperature and salinity affect the density of seawater. This leads to stratification of ocean water. High density water moves below low density and causes the birth of water currents in the oceans.

Q.1.

Source based Question

Oceans in the northern hemisphere record relatively higher temperature than in southern hemisphere. The highest temperature is not recorded at the equator but slightly towards north of it. The average annual temperatures for the northern and southern hemisphere are around 19°C and 16° C respectively. This variation is due to the unequal distribution of land and water in the northern and southern hemisphere.

Answer the following questions

1. Which hemisphere have higher temperature?

Ans. Northern hemisphere.

2. Why is there variation in temperature of both hemisphere?

Ans. Due to unequal distribution of land and water.

3. Where higher temperature are recorded?

Ans. Slightly towards north of the equator.

CHAPTER-14

MOVEMENTS OF OCEAN WATER

The ocean water is dynamic its physical characteristics like temperature salinity, density and the external forces like of the sun, moon and the winds influence the movement of ocean water. The horizontal and vertical motions are common In ocean water bodies. The horizontal motion refers to the ocean currents and waves. The vertical motion refers to tides.

Ocean currents are the continuous flow of huge amount of water in a definite direction.

Objective Questions

Q.1.are actually the energy, not water, which moves across the ocean surface.

Ans. Waves

Q.2. Which of the following oceans has the Auglhas current?

- | | |
|--------------------|------------------|
| (a) Pacific Ocean | (b) Indian Ocean |
| (c) Atlantic Ocean | (d) Arctic Ocean |

Ans. (b) Indian Ocean

Q.3. The tides that falls on full moon and new moon is called

- | | |
|-------------------|------------------|
| (a) Neap Tides | (b) Spring Tides |
| (c) Diurnal Tides | (d) Mixed Tides |

Ans. (b) Spring Tides

Q.4. What causes tide?

- | | |
|------------------|-------------------------|
| (a) Winds | (b) Curious force |
| (c) Solar energy | (d) Gravitational force |

Ans. (d) Gravitational force

Q.5. The horizontal distance between two successive crest is called .

Ans. wavelength

Q.6. Which of the following shows the speed of water caused by climatic effects ?

- (a) Surges
- (b) Ebbs
- (c) Drift
- (d) Gyres

Ans. (a) Surges

Q.7. The highest part of water is _____

- (a) Amplitude
- (b) Crest
- (c) Trough
- (d) Frequency

Ans. (c) Crest

Q.8. Wave amplitude is :

- (a) Half of the wave height
- (b) The height of the wave
- (c) The breadth of the wave
- (d) Highest part of wave

Ans. (a) Half of the wave height

Q.9. The most common tidal pattern, featuring two high tides and two low tides each day is called—

- (a) Mixed tide
- (b) Semi-diurnal
- (c) Diurnal tide
- (d) Neap

Ans. (b) Semi-diurnal

Q.10. The earth reaches its perihelion in:

- (a) July
- (b) January
- (c) December
- (d) March

Ans. (b) January

Short Answer Questions

Q.1. Explain the difference between waves and currents

Ans.	Waves	Currents
	Water in the waves does not move ahead.	Water moves ahead from one place to another.
	The motion of the surface water seldom affects stagnant deep bottom water of the oceans.	Currents are sufficiently deep to impact.
	Wind provides energy to the waves.	Currents moves due to the impact of permanent winds.
	The size of the waves depends on the depth of the water.	The streams are always of huge size, their areas are filled with fish.
	The waves are permanent, destruction and construction is an ongoing process.	The currents are the continuous flow of water in a definite direction.

Q.2. What is meant by tidal current?

Ans. When the tide is channelled between islands or into bays and estuaries, they are called tidal currents.

Q.3. How does tides affect navigation?

Or

How is tides related to navigation ?

Ans. Tidal flows are of great importance in navigation. Tidal Heights are very important especially harbours near rivers and within estuaries having shallow bars at the entrance, which prevent ships and boats

from entering into the harbour. Kolkata and London ports are the examples of benefiting due to tides.

Q.4. Differentiate between perihelion and aphelion.

Ans. When the earth is closest to the sun is known as perihelion, around 3rd January each year where as aphelion occurs on 4th July when the earth is farthest from the sun.

Long answer Questions

Q.1. Describe the major types of Tides and their importance.

Ans. The periodical rise and fall of the sea level, once or twice a day, mainly due to the attraction of the sun and the moon, is called a tide.

Types of Tides

(a) Tides based on Frequency

1. Semi-diurnal tide
2. Diurnal tide
3. Mixed tide

(b) Tides based on heights

1. Spring Tides
2. Neap Tides

Importance of the Tides

1. Tides help the ships and boats to enter into harbours situated near rivers and estuaries having shallow bars at the entrance.
2. Tides are also helpful in desilting the sediments and in removing polluted water from river estuaries.
3. Tides are used to generate electrical power.

4. Tides help, the navigators and fisherman to plan their activities.
5. Due to tides seawater remains dynamic in result water does not freeze in the colder areas.

Q.2. Mention the characteristics of waves

Ans. **Wave crest and trough:** The highest and lowest points of a wave are called the crest and trough respectively.

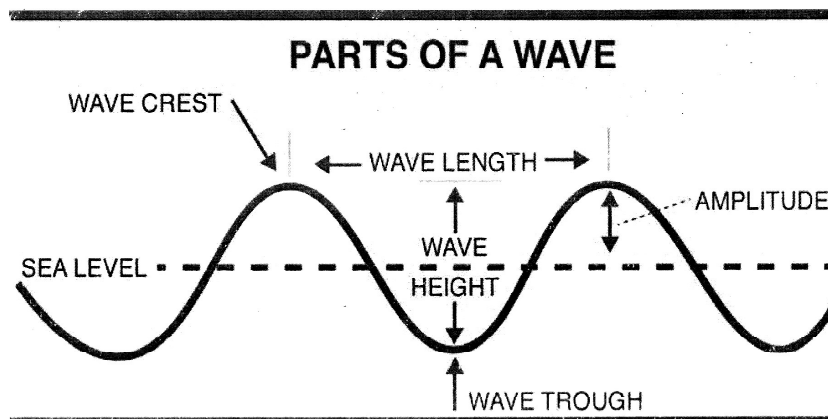
Wave height: It is the vertical distance from the bottom of a trough to the top of a crest of a wave.

Wave amplitude: It is one half of the wave height.

Wave period: It is merely the time interval between two successive wave crests or troughs as they pass a fixed point.

Wavelength: It is the horizontal distance between two successive crests. **Wave speed:** It is the rate at which the wave moves through the water, and is measured in knots.

Wave frequency: It is the number of waves passing a given point during a one second time interval.



Q.3. What are ocean currents called? Give reasons for their origin.

Ans. Ocean currents are the continuous flow of huge amount of water in a definite direction.

Causes of Origin of Currents

Ocean currents are influenced by two types of forces namely:

1. Primary forces - that initiate the movement of water.
2. Secondary forces- that influence the currents to flow

Primary forces include the following

1. Heating by solar energy
2. Wind
3. Gravity
4. Coriolis force

Secondary forces include the following

1. Temperature difference
2. Salinity difference
3. Density difference

Q.4. Classify the ocean currents based on depth and temperature.

Ans. **Classification of ocean currents based on their depth**

1. Surface currents- constitutes about 10% of all the water in the ocean. These waters are the upper 400 metre of the ocean.
2. Deep water currents- make up the other 90% of the ocean water, these waters move around the ocean basins due to the variations in the density and gravity.

Classification of ocean currents based on temperature

1. Cold currents-bring cold water into warm water areas These currents are usually found on the west coast of the continents in the low and middle latitudes and on the east coast in the higher

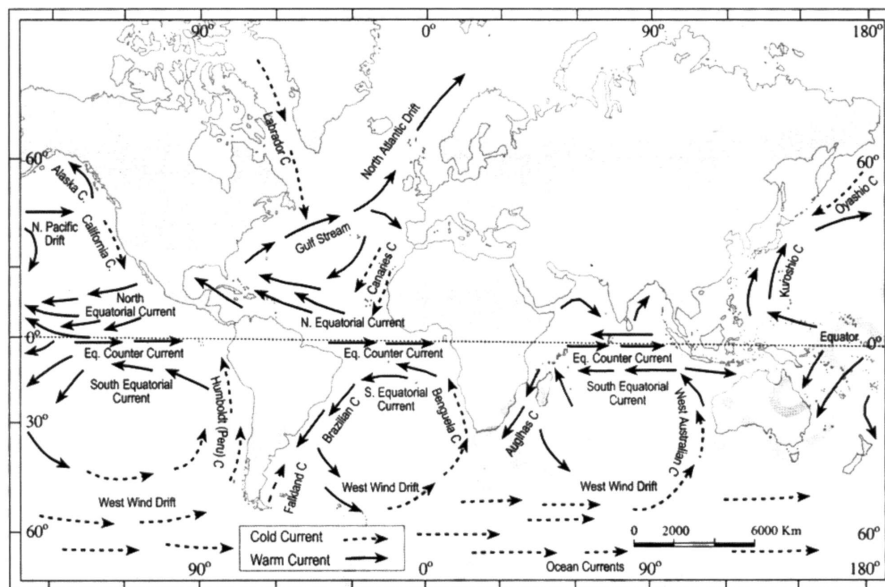
latitudes in the northern hemisphere.

2. Warm currents- bring warm water into cold water areas and are usually observed on the east coast of continents in the low and Middle latitudes, in the Northern hemisphere they are found on the West Coast of continents in high latitudes

Q.5. What are the effects of ocean currents?

Ans. Ocean currents have the following effects:

1. The currents affect the temperature and narrows down the Diurnal and annual range of temperature of the visiting and surrounding area. Warm currents increase the temperature of colder areas and vice versa.
2. Ocean currents can also cause other climate changes, such as increased fog humidity etc.



3. The mixing of warm and cold currents help to replenish the oxygen and favour the growth of planktons, the primary food for fish population, the best fishing Grounds of the world exist mainly in the mixing zones.

Source Based Question

1. Currents are referred to by their "drift". Usually the currents are strongest near the surface and may attain speeds over five knots. At depths, currents are generally slow with speeds less than 0.5 knots. We refer to the speed of a current as its drifts. Drift is measured in terms of knots. The strength of a current refers to the speed of the current. A fast current is considered strong. A current is generally strongest at the surface and decreases in strength with depth. Most currents have speeds less than or equal to 5 knots.

Answer the following questions:

1. Where currents are more strong?

Ans. Knots.

2. Where currents are more strong?

Ans. At the surface.

3. Where currents are slow?

Ans. At depths.

CHAPTER-16

BIODIVERSITY AND CONSERVATION

- Biodiversity as we have today is the result of 2.5-3.5 billion years of evolution.
- Since, the emergence of humans, however, biodiversity has begun a Rapid decline, with one species after another bearing the brunt of extinction due to overuse.
- Biodiversity itself is a combination of two words, Bio (life) and diversity (variety). In simple terms, biodiversity is the number and variety of organisms found within a specified geographical region.
- Biodiversity is not found evenly on the earth. It is consistently richer in the tropics. AS one approaches the polar regions, one finds larger and larger populations of fewer and fewer species.
- The number of species globally vary from 2 million to 100 million, with 10 million being the best estimate.
- Biodiversity is our living wealth. It is a system in constant evolution, from view point of species, as well as from view point of an individual organism.
- Biodiversity is widespread in areas of the world where the availability of solar energy and water is high.
- 99% of the species that have ever lived on the earth hour today are extinct.

- The level of biodiversity is a good indicator of the state of our relationship with other living species.

Objective Questions

Q.1. Which of the following is related to biodiversity ?

- (a) Types of plants
- (b) Animals
- (c) Micro-organisms
- (d) All of the above

Ans. (d) All of the above

Q.2. Which of the following diversity is difficult and complex to delimit ?

- (a) Genetic diversity
- (b) Ecosystem diversity
- (c) Species diversity
- (d) Scientific diversity

Ans. (b) Ecosystem diversity

Q.3. Areas rich in _____ diversity are called Hotspot of diversity.

Ans. Species

Q.4. What is called the list published by IUCN about all the endangered species in the world ?

- (a) Green list
- (b) Blacklist
- (c) Red list
- (d) Blue list

Ans. (c) Red list

Q.5. Government of India passed Wildlife Protection Act in 1972 and _____ in 1973.

Ans. Project Tiger

Q.6. Out of the following, where does three fourth of the world's population live?

- (a) Tropical regions
- (b) Temperate regions
- (c) Mountainous regions
- (d) Coastal desert regions

Ans. (a) Tropical regions

Q.7. Which of the following has caused the biodiversity loss the most?

- (a) Natural Calamities
- (b) Toxic heavy metals
- (c) Increasing human Population
- (d) Deforestation

Ans. (c) Increasing human population

Q.8. Species which are not the natural inhabitants of the local habitat are called Species.

Ans. Exotic

Q.9. The main reason for the tiger reaching on the verge of extinction is ?

- (a) Deforestation
- (b) Illegal Poaching
- (c) Floods
- (d) Pandemic

Ans. (b) Illegal Poaching

Q.10. Which one is not correctly matched?

Continents	Hot-Spots
(a) Africa	Upper Guinean Forests
(b) Australia	Queen stard
(c) Asia	Philippines
(d) Asia	Melanesia

Ans. (d) Asia — Melanesia

Source Based Questions

Loss of Bio Diversity

Natural calamities such as earthquakes, floods, volcanic eruptions, forest fires, droughts, etc. cause damage to the flora and fauna of the earth, bringing change the biodiversity of respective affected regions. Pesticides and other pollutants such as hydrocarbons and toxic heavy metals destroy the weak and sensitive species. Species which are not the natural inhabitants of the local habitat but are introduced into the system, are called exotic species. There are many examples when a natural biotic community of the ecosystem suffered extensive damage because of the introduction of exotic species. During the last few decades, some animals like tigers, elephants, rhinoceros, crocodiles, minks and birds were hunted mercilessly by poachers for their horn, tusks, hides, etc. It has resulted in the rendering of certain types of organisms as endangered category.

11.1 What is the main reason for the decline in the number of Elephants?

Ans. Illegal Poaching/Hunting

11.2 What threatens sensitive and vulnerable species?

Ans. Use of pesticides and other pollutants.

11.3 Which Natural disasters are responsible for the loss of biodiversity?

Ans. Earthquakes, floods, volcanic eruptions, forest fires droughts.

Long answer type Questions

Q.1. Explain, what are the three levels at which Biodiversity can be understood?

Ans. Biodiversity can be understood at three levels :

1. Genetic Diversity- Genes are the basic building blocks of various life forms, genetic biodiversity refers to the variation of genes within species, groups of individual organisms having certain similarities in their physical characteristics are called species.
2. Species Diversity - this refers to the variety of species, it relates to the number of species in a defined area, areas rich in species diversity are called hotspots of diversity.
3. Ecosystem Diversity- Ecosystem diversity deals with the variations in ecosystems within a geographical location and its overall impact on human existence and the environment. The demarcation of ecosystem boundaries is difficult and complex.

Q.2. What are the three categories of the threatened species of plants and animals classified by IUCN for the purpose of their conservation?

Ans. The International Union of Conservation (IUCN) has classified the

threatened species of plants and animals into the following three categories :

- (1) **Endangered Species**- it includes those species which are in danger of extinction, the IUCN publishes information about endangered species worldwide as the Red list of threatened species.
- (2) **Vulnerable Species**- this includes the species which are likely to be in danger of extinction in the in near future if the factors threatening to their extinction continue. Survival of the species is not as good as their population has reduced greatly.
- (3) **Rare Species**- population of the species is very small in the world; they are confined to Limited areas of thinly scattered over a wider area.

Q.3. "Resolutions taken at the convention on Biodiversity helps in its conservation" Examine the statement.

- Ans.
- (i) Efforts should be made to preserve the species that are endangered.
 - (ii) Prevention of extinction requires proper planning and management.
 - (iii) Varieties of food crops, forage plants, timber trees, livestock, animals and their wild relatives should be preserved;
 - (iv) Each country should identify habitats of wild relatives and ensure their protection.
 - (v) Habitats where species feed, breed, rest and nurse their young should be safeguarded and protected.
 - (vi) International trade in wild plants and animals be regulated.

Q.4. Evaluate the Importance of Biodiversity.

Ans. Biodiversity plays the following important roles :

1. **Ecological Importance-** species of many kinds perform some function or the other in an ecosystem. Species capture and store energy, produce and decompose organic materials, help to cycle water and nutrients throughout the ecosystem, fix atmospheric gases and help regulate the climate. these functions are important for ecosystem function and human survival, in other words, the more the variety of species in an ecosystem, the more stable the ecosystem is likely to be.
2. **Economic Importance-** For all humans, biodiversity is an important resource in their day-to-day life. One important part of biodiversity is 'crop diversity, which is also called agro-biodiversity. Biodiversity is seen as a reservoir of resources to be drawn upon for the manufacture of food, pharmaceutical, and cosmetic products. This concept of biological resources is responsible for the deterioration of biodiversity. At the same time, it is also the origin of new conflicts dealing with rules of division and appropriation of natural resources. Some of the important economic commodities that biodiversity supplies to humankind are: food crops, livestock, forestry, fish, medicinal resources, etc.
3. **Scientific Importance-** biodiversity is important because each species can give us some clue as to how life evolve and will continue to evolve. Biodiversity also helps in understanding how life functions and the role of each species in sustaining ecosystem of which we are also species.

Q.5. What is Mega diversity centres? Explain.

Ans. There are some countries which are situated in the tropical region ; they possess a large number of the world's species diversity. They are called megadiversity centres, there are 12 such countries namely Mexico, Colombia, Ecuador, Peru, Brazil, Zaire, Madagascar, China, India, Malaysia, Indonesia and Australia in which these centres are located .

Q.6. What measures has been taken by the Government of India to protect and propagate different type of species?

Ans. To protect preserve and propagate the variety of species within natural boundaries, the government of India passed the wild life (protection) Act, 1972, under which national parks and sanctuaries were established and biosphere reserves declared.

Q.7. What are the factors responsible for the loss of Biodiversity?

Ans. The following factors are responsible for the loss of Biodiversity:

1. Loss of habitat
2. Exponential Population Growth
3. Exotic species
4. Pollution
5. Deforestation
6. Poaching
7. Natural Calamities

Q.8. Classify the ecological hotspots located in different continents.

Continents	Hotspots
South and Central America	I. Central America highland Forests II. Western Ecuador and Colombian choco III. Atlantic forest, Brazil IV. Tropical Anderson V. Central American lowland forests
Africa	I. Eastern Madagascar II. Upper Guinean Forests III. Eastern Arc mountains, Tanzania
Asia	I. Western Ghats, Eastern Himalaya, India II. Sinharaja Forest. Sri Lanka III. Indonesia IV. Peninsular Malaysia V. Philippines VI. Northern Borneo
Australia	I. Queensland II. Melanesia (New Caledonia)

Content

<i>S.No.</i>	<i>Chapter Name</i>
Unit I : Introduction	
1.	India — Location
Unit II : Physiography	
2.	Structure and Physiography
3.	Drainage System
Unit III : Climate, Vegetation and Soil	
4.	Climate
5.	Natural Vegetation
6.	Soils
Unit IV : Natural Hazards and Disasters: Causes, Consequences and Management	
7.	Natural Hazards and Disasters

• **Important Maps**

Chapter-1

India : Location

- India has area of 3.28 million sq. km.
- India accounts for 2.4 per cent of the world's land surface area and stands as the seventh largest country in the world.
- India is located in the south-central part of the continent of Asia, bordering the Indian ocean and its two arms extending in the form of Bay of Bengal and the Arabian Sea.
- The latitudinal and longitudinal extent of India is $8^{\circ}4'N$ - $37^{\circ}6'N$ and $68^{\circ}7'E$ - $97^{\circ}25'E$ respectively. There is about 30 degrees, difference between its latitudinal and longitudinal extent.
- The actual distance of India measured from north to south extremity is 3,214 km, and that from east to west is only 2,933 km.
- India's territorial limit further extends towards the sea up to 12 nautical miles (about 21.9 km) from the coast.
- Our southern boundary extends up to $6^{\circ}45' N$ latitude in the Bay of Bengal. This was represented by Indira point which was submerged during 2004 Tsunami.
- $82^{\circ}30' E$ has been selected as the 'standard meridian' of India. Indian Standard Time is ahead of Greenwich Mean Time by 5 hours and 30 minutes.
- India has a coastline of 6,100 km in the mainland and 7,517 km in the entire geographical coast of the mainland plus the island groups

Andaman and Nicobar located in the Bay of Bengal and the Lakshadweep in the Arabian Sea.



- Currently India has 28 states and 8 Union Territories, Rajasthan is the largest and Goa is the smallest state in terms of area, while Uttar

Pradesh is the largest and Sikkim is the smallest state in terms of population.

- Terrestrial border of India touches 7 countries, these countries are Pakistan, Afghanistan, China, Nepal, Bhutan, Bangladesh and Myanmar.
- India has longest terrestrial border with Bangladesh.
- Sri Lanka and Maldives are the two island countries located in the Indian Ocean, which are our neighbours.
- Sri Lanka is separated from India by the Gulf of Mannar and Palk Strait.

Objective type Questions

Q.1. Which of the following hemispheres is India located in?

- (a) Eastern hemisphere
- (b) Northern hemisphere
- (c) Eastern and Northern hemisphere
- (d) Southern hemisphere

Ans. (c) Eastern and Northern hemisphere

Q.2. Which latitude line divides India into two parts?

- (a) Equator
- (b) Tropic of cancer
- (c) Tropic of Capricorn
- (d) Arctic circle

Ans. (b) Tropic of Cancer

Q.3. The total geographical area of India is (Lakh Km.Square)

- (a) 32.80 (b) 22.80
(c) 42.08 (d) 30.80

Ans. (a) 32.80

Q.4. Which of the following countries does not touch India's borders?

- (a) China (b) Bangladesh
(c) Myanmar (d) Kyrgyzstan

Ans. (d) Kyrgyzstan

Q.5. Which one is the largest state of India (in terms of area)?

- (a) Maharashtra (b) Uttar Pradesh
(c) Rajasthan (d) Madhya Pradesh

Ans. (c) Rajasthan

Q.6. Currently there are total states in India is

- (a) 28 (b) 29
(c) 30 (d) 27

Ans. (a) 28

Q.7. India is ranked in the world by geographical area

- (a) 5 (b) 6
(c) 7 (d) 8

Ans. (c) 7

Q.8. The southernmost point of the Indian Union was

- (a) Kanyakumari
- (b) Indira point
- (c) Rameshwaram
- (d) Barren Island

Ans. (b) Indira point

Q.9. Which of the following countries is not bigger than India in terms of area

- (a) Canada
- (b) Australia
- (c) France
- (d) Brazil

Ans (c) France

Q.10. Which of the following is the latest union territory of India?

- (a) Jammu and Kashmir
- (b) Ladakh
- (c) Dadra and Nagar Haveli and Daman and Diu
- (d) All of the above

Ans. (c) All of the above

Q.11. Telangana state is separated from which of the following state?

- (a) Kerala
- (b) Jammu and Kashmir
- (c) Andhra Pradesh
- (d) Tamilnadu

Ans. (c) Andhra Pradesh

Q.12. The Shape of India is

Ans. Quadrilateral

Q.13. Indian Standard Time is ahead of Greenwich Mean Time by

Ans. 5 hours and 30 minutes.

Q.14. India is situated at the upper end of the

Ans. Indian Ocean.

Q.15. The is a saline swamp located in the western part of India.

Ans. Rann of Kutchh.

Q.16. The total length of India's coastline is km.

- | | |
|-----------|------------|
| (a) 10500 | (b) 7516.6 |
| (c) 3500 | (d) 7500 |

Ans (b) 7516.6

Q.17. Which of the following states the Tropic of Cancer does not pass through?

- | | |
|------------------|-------------|
| (a) Rajasthan | (b) Odisha |
| (c) Chhattisgarh | (d) Tripura |

Ans. (b) Odisha

Q.18. The time difference between eastern and western part of India is

- | | |
|---------------|--------------|
| (a) 30 Minute | (b) 2 Hours |
| (c) 4 Minute | (d) 15 Hours |

Ans. (b) 2 Hours

Short answer type Questions

Q.1. Confirm this statement that the Indian Ocean is actually the Indian Ocean.

Ans. (1) India is also known as Hind i.e. Hindustan. This is the only ocean named after a country called the Indian Ocean.

(2) On the coast of the Indian Ocean between West Asia and East Asia India's position is very important.

(3) The coastline of India located at the northern end of this ocean is also longer than the country's coastline.

Q.2. Why is India's central position at the top of the Indian Ocean important?

Ans. (1) The Indian peninsula is about 1600 km extended into the Indian Ocean.

(2) South-central Arabian Sea in the west and Bay of Bengal in the east. The central position of India at the top of the Indian Ocean in Asia helps establish relations with the developed nations of Europe in the west.

(3) Africa and West Asia, South East Asia, Japan, Business relations with countries like Australia, Newzealand and America etc. are helpful in establishing.

Thus we can say that the Indian Ocean is actually a boon for the country.

Q.3. What are the benefits of India's long coastline?

Ans. The long coastline of India has many benefits:

1. Provides favorable conditions for the development of ports and helps in employment generation.

2. Provide useful waterways for trade.
3. The cross-ocean waterways connecting Africa, industrially developed Europe and prosperous West Asia to the south-east Asian countries, China, Japan with developed industries, Australia and the west coast of the United States pass through India.

Q.4. "The abundant sunshine and monsoonal rainfall from the tropical sun determines the destiny of millions of Indians" Analyse.

Ans. Temperature and rainfall are the two main elements of climate. These have a direct impact on the soil, fauna and human activities here. The fate of agriculture-based industries and the people associated with them is linked to these two climatic elements, so it is perfectly appropriate to say that abundant sunlight and monsoonal rain from the tropical sun sets the fate of millions of Indians.

Q.5. What is a subcontinent called? Write the names of the countries included in the Indian subcontinent.

Ans. A large part of a continent, which is geographically, culturally and economically different from other parts of the continent and has uniformity in its terrain, is called a subcontinent. The Indian subcontinent includes Pakistan in the northwest, Nepal, Bhutan in the north, Bangladesh in the east and India in the middle.

Q.6. Why is there a time variation of 2 hours between the easternmost and westernmost part of the country? Explain the statement.

Ans. Longitudinal extent of India has the difference of 30° . There is time variation of 2 hours between easternmost and the westernmost parts of our country. The sun rises two hours earlier in Arunachal Pradesh as compared to Gujarat. This is because the earth is tilted and also it

rotates in east to west direction. So while rotation, the eastern parts of the world experiences the sun rays earlier as compared to the western parts of the world. 1 degree = 4 minutes 30 degree = 4 x 30 = 120 minutes 120 minutes = 2 hours

Q.7. Name the countries larger in area than India?

Ans. India is the seventh largest country in the world. The following countries are larger in area than India: Russia, China, Canada, U.S.A., Brazil and Australia.

Chapter 2

Structure and Physiography

- The earth and its landforms that we see today have evolved over a very long time.
- Current estimation shows that the earth is approximately 460 million years old. Over these long years, it has undergone many changes brought about primarily by the endogenic and oxygenic forces.
- Indian plate was to the south of the equator millions of years ago.
- Over millions of years, this plate broke into many parts and the Australian plate moved towards the south-eastern direction and the Indian plate to the north.
- Based on the variations in its geological structure and formations, India can be divided into three geological divisions. These geological regions broadly follow the physical features: The Peninsular Block, The Himalayas and other Peninsular Mountains, Indo-Ganga-Brahmaputra Plain.
- The Peninsula is formed essentially by a great complex of very ancient gneisses and granites, which constitutes a major part of it. Since the Cambrian period, the Peninsula has been standing like a rigid block with the exception of some of its western coast which is submerged beneath the sea and some other parts changed due to tectonic activity without affecting the original basement.
- The Himalayas along with other Peninsular mountains are young, weak and flexible in their geological structure.

- INDO-GANGA-BRAHMAPUTRA PLAIN Originally, it was a geo-synclinal depression which attained its maximum development during the third phase of the Himalayan mountain formation approximately about 64 million years ago.
- Based on these macro variations, India can be divided into the following physiographic divisions:
 - (1) The Northern and North-eastern Mountains
 - (2) The Northern Plain
 - (3) The Peninsular Plateau
 - (4) The Indian Desert
 - (5) The Coastal Plains
 - (6) The Islands.

Objective type Questions

Q.1. In which part of the Himalayas Karewas are found?

- | | |
|------------------------------------|--------------------------|
| (a) Kashmir Himalayas | (b) North-East Himalayas |
| (c) Eastern Himalayas | |
| (d) Himachal-Uttarakhand Himalayas | |

Ans. (a) Kashmir Himalayas

Q.2. Which of the following is the oldest landmass of India ?

- | | |
|---------------------|------------------------|
| (a) Northern Plains | (b) Peninsular Plateau |
| (c) Himalayas | (d) Aravavlli |

Ans. (b) Peninsular Plateau

Q.3. The following is called the latest alluvial deposit

- (a) Khadar
- (b) Bhangar
- (c) Bhabar
- (d) Tarai

Ans. (a) Khadar

Q.4. Which ancient sea was in place of Himalayan mountain?

- (a) Tethys sea
- (b) Southern Ocean
- (c) Arabian Sea
- (d) Indian Ocean

Ans. (a) Tethys sea

Q.5. Which of the following is an example of the youngest mountain range of India?

- (a) Aravalli
- (b) Satpura
- (c) Vindhya
- (d) Himalayas

Ans. (d) Himalayas

Q.6. Luni River flows in _____.

Ans. Rajasthan

Q.7. Pass is situated between the Nilgiri and Annamalai hills.

Ans. The Palghat

Q.8. Which of the following part is a cold desert in the Kashmir Himalayas?

- (a) North-eastern part
- (b) North-western part
- (c) Eastern part
- (d) South-western part

Ans. (a) North-eastern part

tric power potential in the country. An important aspect of the Arunachal Himalayas is the numerous ethnic tribal community inhabiting in these areas. Some of the prominent ones from west to east are the Monpa, Abor, Mishmi, Nyishi and the Nagas. Most of these communities practise Jhumming. It is also known as shifting or slash and burn cultivation. This region is rich in biodiversity which has been preserved by the indigenous communities. Due to rugged topography, the inter-valley transportation linkages are nominal. Hence, most of the interactions are carried through the duar region along the Arunachal-Assam border.

Q.1. Which of the following subdivision of Himalayan Mountains is described in the above paragraph?

- (a) Himachal and Uttarakhand Himalayas
- (b) Kashmir Himalayas
- (c) Arunachal Himalayas
- (d) Darjiling Himalayas

Ans. (c) Arunachal Himalayas

Q.2. This subdivision of Himalaya Mountains is rich in?

- (a) tribal community
- (b) biodiversity
- (c) Trade
- (d) Perennial Rivers

Ans. (b) Biodiversity

Q.3. Mishmi and Nyishi communities practise for livelihood.

Ans. Jhumming cultivation

Q.4. Which of the following pass is related to this subdivision of Himalayas?

- (a) Diphu pass
- (b) Zojila pass
- (c) Bara Lacha pass
- (d) All of the above

Ans. (a) Diphu pass

Short and Long Answer type Questions

Q.1. Write the differences between Bhabar and Terai.

Ans.	Bhabar	Tarai
	This region extends from the Indus River to the Teesta River.	South of the Bhabar is the Tarai belt.
	Bhabar is a narrow belt ranging between 8-10 km.	Terai has the width of 10-20 km.
	It is unsuitable for Agriculture	It is suitable for Agriculture
	The streams and rivers coming from the mountains deposit heavy materials of rocks and boulders here.	It is formed from the finer boulders, thereby, creating marshy and swampy conditions known as the Tarai.
	The rivers coming from the mountains disappear in this zone.	Most of the streams and rivers re-emerge here which disappeared in Bhabar.

Q.2. Explain the difference between Bhangar and Khadar.

Ans.	Bhangar	Khadar
	Bhangar pradesh is higher than the flood level.	Floods occur every year in Khadar region.
	It is not useful for Agriculture.	Intensive farming is done here.
	It is a high state made of old alluvial soil.	It is a lowland state made of fine alluvial soil.
	These soils are coarser in texture.	These soils are finer in texture.
	In punjab it is called chhaya.	In punjab it is called bet.

Q.3. Where is the cold desert located in India? Name the main ranges of this region?

Ans. The north-eastern part of the Kashmir Himalayas is a cold desert, which lies between the Greater Himalayas and the Karakoram ranges. It comprise a series of ranges such as the

1. Karakoram
2. Ladakh
3. Zaskar
4. Pir Panjal.

Q.4. State the three features of the eastern hills of the Himalayan ranges?

- Ans.
1. These are parts of the Himalayan mountain system having their general alignment from the north to the south direction.
 2. They are known by different local names. In the north, they are known as Patkai Bum, Naga hills, the Manipur hills and in the south as Mizo or Lushai hills.
 3. These are low hills, inhabited by numerous tribal groups practising Jhum cultivation.

Q.5. Analyse the difference between Arabian Sea and Bay of Bengal Islands group.

Ans.	Islands group of Arabian Sea	Islands group of Bay of Bengal
	There are approximately 36 islands of which 11 are inhabited.	The Bay of Bengal Islands groups consist of about 572 Islands/islets.
	These are situated roughly between 8°N-12°N and 71°E-74°E.	These are scattered between 6°N-14°N and 92°E-94°E.
	They are separated by a water body which is called the 11° channel.	They are separated by the 10°channel.
	Minicoy is the largest island with an area of 453sq.km.	This group of islands is divided into two broad categories the Andaman in the north and the Nicobar in the south.
	This group of island is built of coral deposits.	This group of island are volcanic in origin.

Q.6. Make a comparative study of the western and the eastern coastal plains?

Ans. The western Coastal plains

1. The western coastal plains are an example of submerged coastal plain.
2. The western coastal plains are narrow in the middle and get broader towards north and south.

3. The rivers flowing through this coastal plain do not form any delta.

The Eastern Coastal Plains

1. It is an example of an emergent coast
2. This coastal plain has less number of ports and harbours because of its emergent nature.
3. There are well developed deltas, formed by the rivers flowing eastward into the Bay of Bengal.

Q.7. Why there is no delta on the western Coastal Plain?

Ans. The rivers flowing through this coastal plain do not form any delta due to their shorter path. hard rocks and have low sediments for deposition.

Q.8. Examine the statement "the Indian Desert was once part of the sea ".

Ans. To the northwest of the Aravalli hills lies the Great Indian Desert. It is believed that during the Mesozoic Era, this region was under the sea. This can be corroborated by the following evidences :

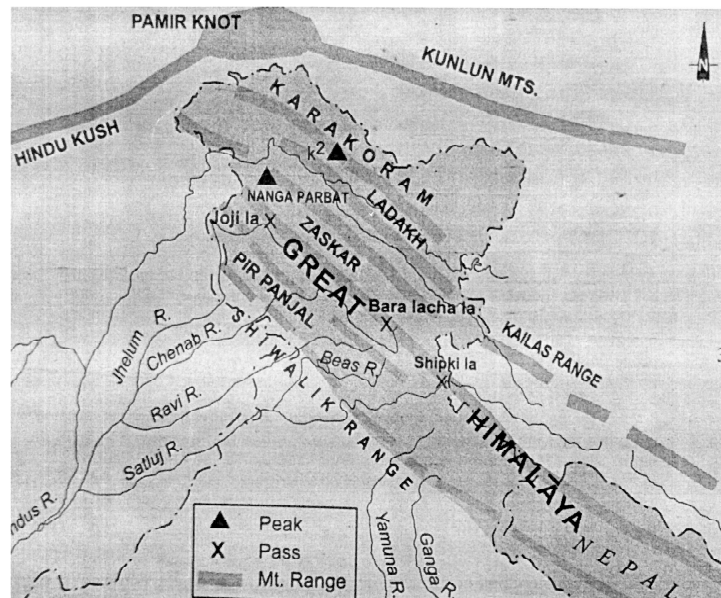
1. Wood fossils park at Aakal
2. Marine deposits around Brahmsar. near Jaisalmer.

Q.9. Which tribes reside in Arunachal Pradesh?

Ans. The Arunachal Himalayas is inhabited by numerous ethnic tribal community from west to east are the Monpa, Daffla, Abor, Mishmi, Nishi and The Nagas.

Q.10. Analyse the north and north eastern mountains ranges of India in five points.

- Ans.
- I. The north and Northeastern mountains consist of the Himalayas and the Northeastern hills.
 - II. The Himalayas consist of a series of parallel mountain ranges. Some of the important ranges are the Greater Himalayan range, which includes the Great Himalayas and the Trans Himalayan range, the middle Himalayas and the Shiwalik.
 - III. The approximate length of the Great Himalayan range, also known as the central axial range, is 2500km from east to west, and their width varies between 160-400km from north to south.
 - IV. The general orientation of these ranges is from northwest to the southeast direction in the northwestern part of India.
 - V. In Arunachal Pradesh they are from southwest to the northwest direction while in Nagaland, Manipur and Mizoram, they are in the north-south direction.
 - VI. Himalayas are not only the physical barrier, they are also a climatic drainage and cultural divide.



Q.11. Explain the major characteristics of the Peninsular Plateau?

- Ans.
1. Rising from the height of 150 m and above the river plains up to an elevation of 600-900m is the irregular triangle known as the Peninsular Plateau.
 2. Delhi ridge in the northwest, the Rajmahal hills in the east. Gir range in the west and the Cardamom hills in the south constitute the outer extent of the Peninsular Plateau.
 3. This is one of the oldest and the most stable landmass of India.
 4. The general elevation of the Plateau is from the west to the east. which is also proved by the pattern of the flow of rivers.
 5. This is formed by gneiss and granite rocks.
 6. The northwestern part of the Plateau has a complex relief of ravines and gorges. The ravines of Chambal, Bhind and Morena are some of the well known examples.

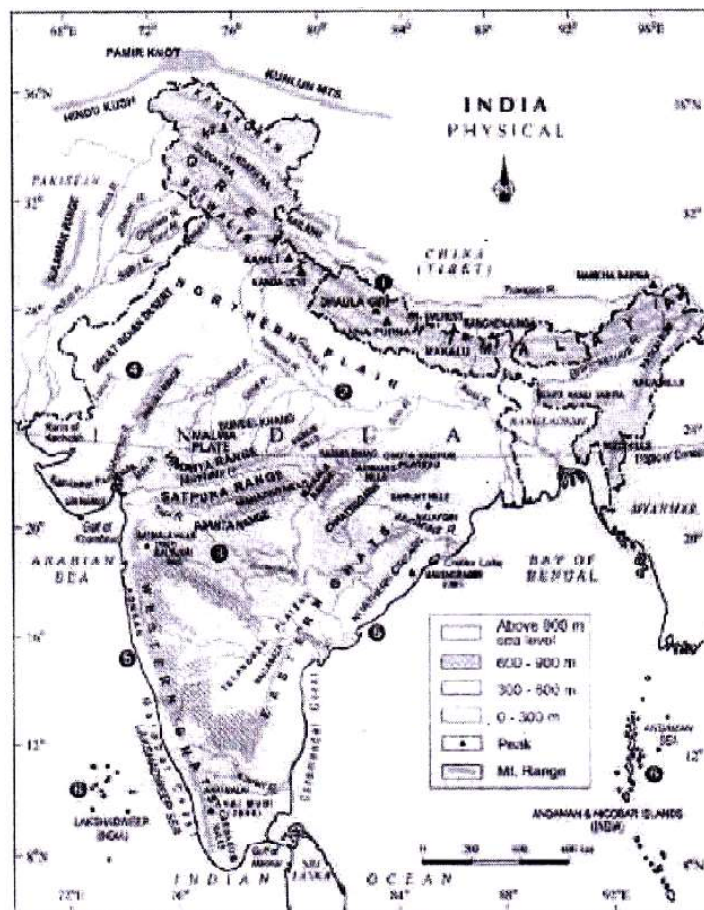
Q.12. Differentiate between Western and Eastern Ghats.

Ans. **Western Ghats**

1. Western Ghats are locally known by different names such as Sahyadri in Maharashtra, Nilgiri hills in Karnataka and Tamilnadu and Anaimalai hills and Cardamom hills in Kerala.
2. Western Ghats are comparatively higher in elevation and more continuous.
3. Their average elevation is about 1500m with the height increasing from north to south.
4. Anaimudi (2695m) is the highest peak of the western ghats.
5. Most of the Peninsular rivers have their origin in the western Ghats.

Eastern Ghats

1. It is discontinuous and have low hills.
2. It is highly eroded by the rivers such as the Mahanadi, the Godavari, the Krishna, the Kaveri, etc.
3. Some of the important ranges of Eastern ghats are Javadi hills, the Palconda range, the Nallamala hills, the Mahendragiri hills, etc.
4. The highest peak of Eastern ghat is Mahendragiri (1501m).
5. The Eastern and the Western Ghats meet each other at the Nilgiri hills.



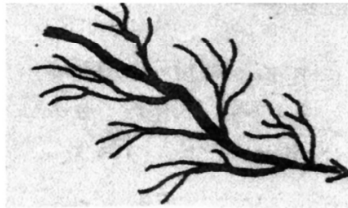
Chapter-3

Drainage System

- The drainage pattern of an area is the outcome of the geological time period, nature and structure of rocks, topography, slope amount of water flowing and the periodicity of the flow.
- The flow of water through well-defined channels is known as 'drainage'. The network of such channels is called a drainage system.
- A river drains the water collected from a specific area which is called its catchment area.
- An area drained by a river and its tributaries is called a drainage basin.
- The boundary line separating one drainage basin from the other is known as the water shed.
- The catchments of large rivers are called river basin whereas those of small riverlets and rills are referred to as water sheds.
- There is a slight difference between, a river basin and a water shed. Water shed are small in area while the basins cover larger areas.
- On the basis of discharge of water (orientation to the sea level) Indian drainage system may be divided into (i) The Arabian sea drainage and (ii) The Bay of Bengal drainage.
- Both are separated from each other through the Delhi ridge, the Aravalis and the Sahyadris.

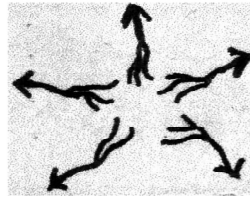
- About 77 percent of the drainage are consisting of the Ganga, the Brahmaputra, the Mahanadi, the Krishna etc and oriented towards the Bay of Bengal whereas 23 percent comprising the Indus, the Narmada, the Tapi, the Mahi and the Periyar systems discharge their waters in the Arabian sea.

Important Drainage Patterns



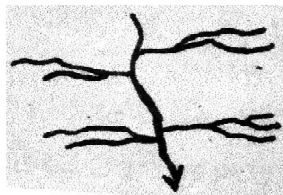
Dendritic

- (i) The drainage pattern resembling the branches of a tree is known as "dendritic" the example of which are the rivers of northern plain.



Radial

- (ii) When the rivers originate from a hill and flow in all directions, the drainage pattern is known as 'radial'. The rivers originating from the Amarkantak range present a good example of it.



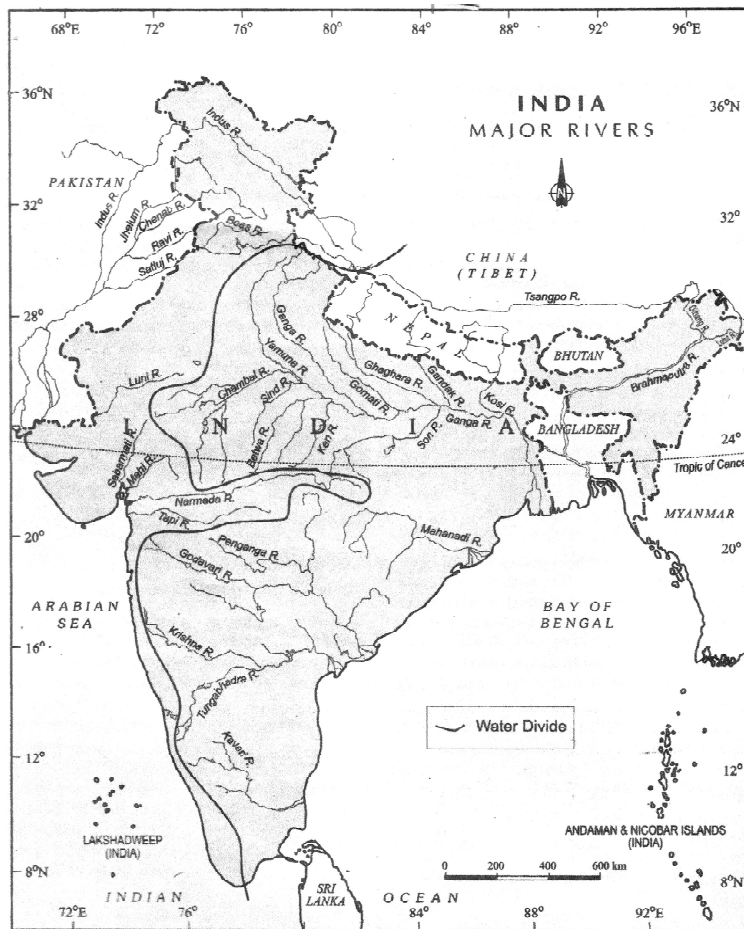
Trellis

- (iii) When the primary tributaries of rivers flow parallel to each other and secondary tributaries join them at right angles, the pattern is known as 'trellis'.



Centripetal

- (iv) When the rivers discharge their waters from all directions in a lake or depression, the pattern is known as 'centripetal'.



MCQS, objective and fill in the blanks, type question and answer.

Q.1. The Indian drainage may be classified into the _____ and _____ .

Ans . Himalayan drainage, Peninsular drainage

Q.2. _____ is known as Ponnani.

Ans . Baharathapuzha

Q.3. Luni river system is the example of which of the following river systems?

- | | |
|----------------|---------------|
| (a) Ephemeral | (b) Enduring |
| (c) Antecedent | (d) Perennial |

Ans . Ephemeral

Q.4. Arrange the correct sequence of column II against the states in column I.

Column I (River)

- I. River Ganga
- II. River Brahmaputra
- III. River Godavari
- IV. River Ghaghara

Column II (Origin)

- 1. Mapchachungo glacier
- 2. Nasik
- 3. Gangotri Glacier
- 4. Chemayungdung Glacier

- | | |
|----------------------------|----------------------------|
| (a) I-3, II-4, III-2, IV-1 | (b) II-2, III-3, IV-1, I-4 |
| (c) IV-3, III-2, II-1, I-4 | (d) III-1, II-4, I-3, IV-2 |

Ans (a)

Q.5. Brahmaputra River is known as Yamuna in _____.

Ans. Bangladesh

Q.6. Which of the the following river does not rise in the Himalayas?

- (a) Ghaghra
- (b) Kosi
- (c) Chambal
- (d) Ganga

Ans - (c) Chambal

Q.7. Which of the following landforms is not formed by deposition?

- (a) Water fall
- (b) Delta
- (c) Ox-bow
- (d) Flood plains

Ans. (a) Waterfall

Q.8. Examine which of the following is not in part of Indo-Brahma river?

- (a) The Indus and its five tributaries in western part.
- (b) The ganga and Himalayan tributaries in the central part.
- (c) The stretch of the Brahmaputra in Assam and its Himalayan tributaries.
- (d) River Godavri and its tributaries in South.

Ans. (d)

Q.9. Which is not associated with the characterstics of peninsula rivers?

- (a) These are perennial
- (b) These are non-perennial
- (c) Follow fixed course
- (d) Absence of meanders

Ans. (a)

Q.10. Which of the following is not associated with river Godavari?

- (a) The largest peninsular river system
- (b) It is called the Dakshin Ganga
- (c) Discharges its water into the Bay of Bengal
- (d) It does not form the delta

Ans. (d)

Q.11. Fill in the blanks:

- (a) The origin of big rivers of peninsular drainage is _____ .
- (b) The origin of major rivers of north India is in _____ .
- (c) A mighty river called Shivalik or Indo-Brahma traversed the entire longitudinal extent of the Himalaya from Assam to Punjab in _____ Period.
- (d) River Brahmaputra is known as _____ in Tibet.
- (e) River originates from Multai in the Betul district of Madhya Pradesh _____ .

Ans. (a) Western Ghats (b) Himalayas (c) Miocene (d) Tsangpo (e) Tapi

Q.12. Match column A with column B .

Column A	Column B
I. Panjnad	a. The largest river system of Rajasthan
II. Pir Panjal	b. Major tributaries of river Krishna
III. Satopanth	c. Important rivers of Goa
IV. Yamunotri	d. The name given to the five rivers of Punjab
V. River Damodar	e. A mountain range
VI. Koyna, Tungbhadra, Bhima	f. A glacier source of Alaknanda
VII. Luni	g. Sorrow of Bengal
VIII. Mandovi and Juari	h. A glacier source of river Yamuna

Ans (a) I-d, II- e, III-f, IV-h, V-g, VI-b, VII-a, VIII-c

Q.13. Given below are two statements, one labeled as Assertion I and the other labelled as Reason II. Select your answer from the codes given below:

Assertion I : Himalayan rivers are perennial

Reason II : The region gets rainfall from the South west monsoon season only.

- (A) I and II are correct and II explains I
- (B) I and II are correct, but II does not explain I
- (C) I is correct, but II is false
- (D) I is false, but II is correct

Ans. (B) I and II are correct but II does not explain I

Short answer Type Questions

Q.1. Why are the rivers of India polluted? Write any three reasons.

- Ans.
- (a) The dirty waters of cities enter into the rivers.
 - (b) Industrial effluents and wastes get disposed of into the rivers.
 - (c) Most of the cremation grounds are on the banks of rivers and the dead bodies are thrown in the rivers.
 - (d) The flowers and statues are immersed in the rivers on the occasion of some festivals.
 - (e) Large scale bathing and washing of clothes.

Q.2. Which river of the Himalayan drainage system is well known for floods, channel shifting and bank erosion. Why?

- Ans. (i) River Bramaputra is well known for floods, channel shifting and bank erosion.
- (ii) This is due to the fact that most of its tributaries are large bring large quantity of sediments.
- (iii) They owing to heavy rainfall in its catchment area.

Q.3. In how many categories on the basis of the size of the water shed, the drainage basins are grouped?

- (a) Major river basins with more than 20,000 sq km of catchment area. It includes 14 drainage basins as the Ganga, the Brahmaputra etc.
- (b) Medium river basins with catchment area between 2000-20,000 sq km in incorporating, 44 river basins such as the Kalinadi, the periyar etc.
- (c) Minor river basins with catchment area of less than 2000 sq km include faerly good number of rivers flowing in the area of low rainfall.

Q.4. What are the problems in using river water?

- Ans. (a) No availability in sufficient quantity
- (b) River water pollution
- (c) Load of silt in the river water
- (d) Uneven seasonal flow of water
- (e) River water disputes between states.
- (f) Shrinking of channels due to the extension of settlements towards the thalweg.

Q.5. Evaluate the extent of usability of river water.

- Ans. (i) The rivers of India carry huge volumes of water per year but it is unevenly distributed both in time and space.
- (ii) There are perennial rivers carrying water throughout the year whereas the nonperennial rivers have very little work, during the dry season.
- (iii) During the rainy season, much of the water is wasted in floods and flows down to the sea. As there is a flood in one part of the country whereas the other area suffers from drought.

Long Answer type Questions

Q.1. What is river regimes? Substantiate with examples.

- Ans. (i) The pattern of flow of water in a river channel over a year is known as its regime. The north Indian rivers originating from the Himalayas are perennial as they are fed by glaciers through snow-melt and receive rainfall water during rainy season.
- (ii) The rivers of South India do not originate from glaciers and their flow pattern witness fluctuations.
- (iii) The flow increases considerably during monsoon rains. The regime of the rivers in South India is controlled by rainfall. It varies from one part of the peninsular plateau to the other.
- (iv) The discharge is the volume of water flowing in a river measured over time. It is measured either in cubic feet per second or cumecs (cubic metres per second)

- (v) The Ganga has its minimum flow during the January - June and maximum flow is attained either in August or in September, after a steady fall in the flow.
- (vi) There are striking differences in the river regimes in the eastern and western parts of the Ganga basin.

Q.2. Make a comparative study between the Himalayan and peninsular rivers.

Ans. The Himalayan Rivers

- (1) It mainly includes the Ganga, the Indus and the Brahmaputra river basins.
- (2) These are fed both by melting of snow and precipitation.
- (3) All rivers pass through the giant gorges carved out by erosional activity carried on simultaneously with the uplift of the Himalayas.
- (4) All these rivers form deep gorges, v-shaped valleys, rapids and waterfalls in their mountainous course.
- (5) In the Himalayan reaches, the course of these rivers is highly tortuous, but over the plains they display a strong meandering tendency & shift their courses frequently.

The Peninsular River System

- (1) The peninsular river system is older than Himalayan one. This is evident from the broad, largely graded shallow valleys, and the maturity of the rivers.
- (2) The western ghats running close to western coast act as the water divide between the major peninsular rivers, discharging their water in the Bay of Bengal and as small rivulets joining the Arabian sea.

- (3) Most of the major peninsular rivers except Narmada and Tapi flow from west to east.
- (4) The Chambal, the Sind, the Betwa, the Ken, the Son, originating in the northern part of the peninsula belong to the Ganga river system.
- (5) Other major river system of the peninsular drainage are the Mahanandi, the Godavri, the Krishna. and the Kaveri. Peninsular rivers are characterised by fixed course absence of meanders and non-perennial flow of water. The Narmada and Tapi which flow through the rift valley are exception.

Q.3. Evaluate the major features of river Ganga.

- Ans
- (1) The Ganga is the most important river of India both the point of view of its basin of and cultural significance.
 - (2) It rises in the Gangotri glacier near gaumukh in the uttarkashi district of Uttarakhand.
 - (3) It is known as the Bhagirathi. It cuts through the central and the lesser Himalayas in narrow gorges. At Devprayag, the Bhagirathi meets the Alaknanda, thereafter, it is known as the Ganga.
 - (4) The Ganga enters the plains at Haridwar from here, it flows first to the South, then to the South east and before splitting into distributaries, namely the Bhagirathi and the Hugli.
 - (5) The river has a length of 2525 km. It is shared by Uttarakhand and Uttar Pradesh, Bihar and West Bengal. The Ganga river system is the largest in India having a number of perennial and non-perennial rivers.

Q.4. Evaluate the major characteristics of river Brahmaputra.

- Ans. (1) The Brahmaputra, one of the largest rivers of the world has its origin in the chemayung dung glacier of the Kailash range near the Mansarover lake.
- (2) It traverses eastward longitudinally for a distance of nearly 1200 km in a dry and flat region of southern Tibet, where it is known as the Tsangpo which means the purifier.
- (3) The river emerges from the foothills under the name of Siang or Dihang. It enters India west of Sadiya town in Arunachal Pradesh flowing Southwest it receives its left bank tributaries, viz, Debang or Sikang and Lohit, there after it is known as Brahmaputra.
- (4) The Rango Tsangpo is the major right bank tributary of this river in Tibet.
- (5) The Brahmaputra receives numerous tributaries in its 750 km long journey through the Assam valley.

Q.5. Evaluate the Godavari river system.

- (1) The Godavari is the largest peninsular river system. It is also called the Dakshin Ganga.
- (2) It rises in the Nasik district of Maharashtra and discharges its water into the Bay of Bengal.
- (3) Its tributaries run through the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha and Andhra Pradesh.
- (4) It is 1465 km long with catchment area spreading over 3.13 lakh sq. km 49% of this lies in Maharashtra, 20% in Madhya Pradesh and Chhattisgarh & rest in Andhra Pradesh.

- (5) The Penganga, the Indravati, the Pranhita, and the Manjra are its principal tributaries.

Source Based Question

Read the plan of action given below carefully and answer the questions that follows.

Why are the rivers polluted? Have you seen the dirty waters of cities entering into the rivers? Where do the industrial effluents and wastes get disposed of? Most of the cremation grounds are on the banks of rivers and the dead bodies are sometimes thrown in the rivers on the occasion of some festivals, the flowers and statues are immersed in the rivers. Large scale bathing and washing of clothes also pollute river waters. How can the rivers be made pollution free? Have you read about Ganga Action Plan, or about a campaign for cleaning the Yamuna at Delhi? Collect materials on schemes for making rivers pollution free and organise the materials in a write up.

Answer any three question

Q.1. Why rivers are polluted?

- (a) Dirty water fall in rivers
- (b) Merge of clean water from mountain
- (c) Falls of rain water
- (d) All of the above

Ans. (a)

Q.2. Rivers can be free from pollution?

- (a) No industrial effluents be thrown in rivers
- (b) Stopping the dispose of dead bodies

- (c) To prevent the remains of festive materials
- (d) All of the above

Ans. (d)

Q.3. What is Ganga Action Plan?

- (a) To maintain the purity of river Ganga
- (b) To keep clean the holy river Ganga
- (c) All urban sewage nallas have been checked from merging into the river
- (d) All of the above

Ans. (d)

Q.4. What is the achievement of Yamuna Clean Campaign?

- (a) Starting a cleaning campaign for river Yamuna
- (b) Throwing of remaining articles of festive seasons completely banned.
- (c) Iron net sheets fixed at Yamuna bridges to check the throwing of articles in the river
- (d) All of the above

Ans. (d)

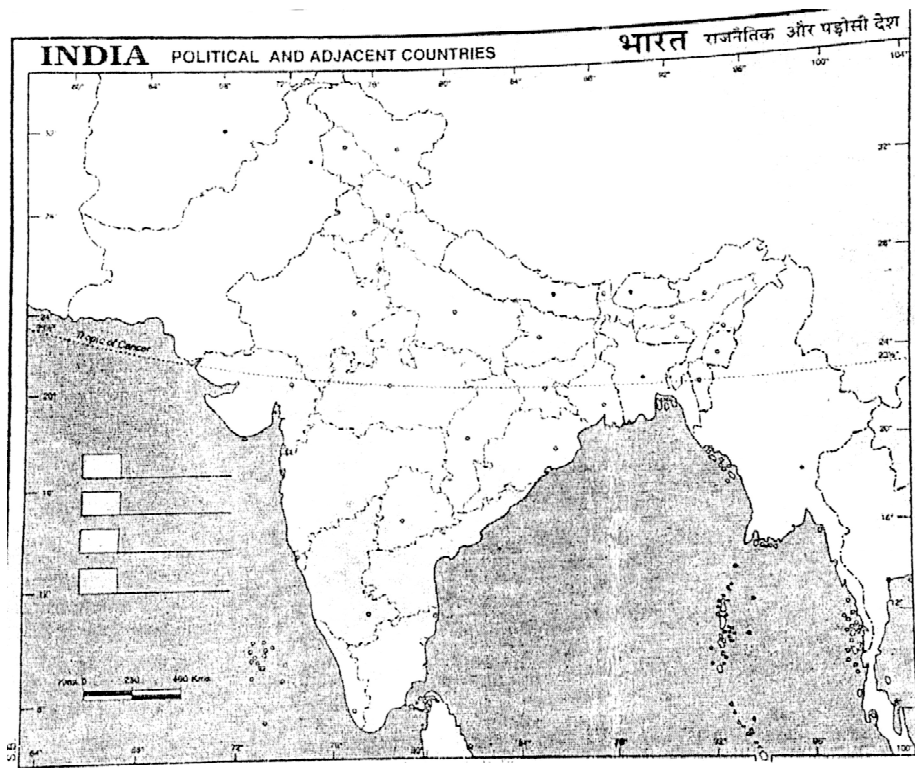
MAPWORK

Show the following rivers in an outline political map of India given below.

- | | |
|------------------|----------------------|
| 1. Indus river | 2. Satluj river |
| 3. River Ganga | 4. River Brahmaputra |
| 5. River Damodar | 6. River Mahanadi |
| 7. River Luni | 8. River Narmada |
| 9. River Tapi | 10. River Godavari |

11. River Krishna

12. River Kaveri



Lesson – 4

CLIMATE

- In the southern part of India, woollen clothers are not required. In north eastern states, winters are mild except in the hills.
- There are variations in weather conditions during various seasons.
- These changes occur due to the changes in the elements of weather (temperature, pressure, wind direction and velocity, humidity and precipitation etc.).
- India has hot monsoonal climate which is the prevalent climate in south and south east Asia.
- Monsoon connotes the climate associated with seasonal reversal in the direction of winds.
- The monsoon regime emphasises the unity of India with the rest of South-East Asian region.
- The climate of India has many regional variations expressed in the pattern of winds, temperature and rain fall, rhythm of seasons and the degree of wetness or dryness.
- In the summer the mercury occasionally touches 55°C in the western Rajasthan it drops down to as low as minus 45°C in winter around Leh. Churu in Rajasthan may record a temperature of 50°C a more on a June day while the mercury touches 19°C in Twang on the same day.
- On a December night temperature in Drass may drop down to minus

45°C where as. Thiruvananthapuram or Chennai on the same night records 20°C or 22°C.

- These examples confirm that there are seasonal variations in temperature from place to place and from region to region in India.
- While snow fall occurs in the Himalayas, it only rains over the rest of the country.
- Variations are noticeable not only in the type of precipitation but also its amount. Cherapunji and Mawsynram in Meghalaya receive rainfall over 1080 cm in a year, Jaisalmer in Rajasthan gets more than 9 cm of rainfall during the same period.
- The annual precipitation is less than 10 cm in the north-west Himalayas and the western deserts, it exceeds 400 cm in Meghalaya.
- In spite of these differences and variations, the climate of India is monsoonal in rhythm and character.
- Change is the law of nature. Climate has witnessed change in past at the global as well as local levels.

MCQS, objective and fill in the blanks, type question and answers.

Q.1. Climate of India is _____ .

Ans. Monsoonal

Q.2. Churu (Rajasthan) is the example of which of the following place?

- (a) Coldest place
- (b) Hottest place
- (c) Place of very scanty rainfall
- (d) Place receives large amount rainfall

Ans (b)

Q.3. Examine which of the following usually explains the feature of the weather.

- (a) A momentary state of the atmosphere
- (b) Average of the weather conditions over a longer period of time.
- (c) A change in climate after 50 years or more.
- (d) Climate changes quickly.

Ans. (a)

Q.4. Which of the following receives a huge amount of rainfall?

- (a) Shillong
- (b) Guwahati
- (c) Mawsynram
- (d) Jaisalmer

Ans. (c)

Q. 5. Which season is not included in the season recognised by the meteorologists?

- (a) The cold weather season
- (b) The hot weather season
- (c) The South west monsoon season
- (d) Spring weather season

Ans. (d)

Q.6. 'Loo' is an example of which of the following local storms?

- (a) Hot dry and oppressing winds.
- (b) Dreaded evening thunder storms.
- (c) A clamity of the month of Baishakh.
- (d) They are known as Bardoll.

Ans. (a)

Q.7. Arrange the correct sequence of column II against the states in column I.

Column I	Column II
I. Arunachal Pradesh	1. As
II. Extreme western Rajasthan	2. Bshw
III. Coromondal coast of Tamilnadu	3. Dfc
IV. North Western Gujarat	4. Bwhw

(a) I-3, II-4, III-1, IV-2 (b) II-4, I-1, III-3, IV-2
(c) III-3, II-2, IV-1, I-4 (d) I-1, II-4, III-2, IV-3

Ans (a)

Q.8. The tropical zone being nearer to the equator which of the following is experience throughout the year.

- (A) High temperature with small daily and annual range
- (B) High temperature with high daily and annual range
- (C) Low temperature and high daily and annual range
- (D) Low temperature and small daily and annual range

Ans. (A) High temperature with small daily and annual range

Q.9. Which of the following steers the tropical depression into India?

- (A) Westerly jet stream (B) Eastern wind
- (C) Easterly jet stream (D) Western wind

Ans. (C) Easterly jet stream

Q.10. In which direction the winds 'start blowing due to the shift of I.T.C.Z to South ward?

- (A) From South-East to South west
- (B) From South-West to North East
- (C) North East to North-West
- (D) North West to South West

Ans. (B) From South-West to North East

Q.11. Which one of the following is not a fact regarding South India?

- (a) Diurnal range of temperature is less here
- (b) Annual range of temperature is less here.
- (c) Temperatures here are high through out the year
- (d) Extreme climate conditions are found here.

Ans. (d)

Q.12. Which one of the following phenomenon happens when the sun shines vertically over the Tropic of Capricorn in the southern hemisphere?

- (a) High pressure develops over North-western India due to low temperature.
- (b) Low pressure develops over North western India due to high temperatures.
- (c) No changes in temperatures and pressure occur in north western India.
- (d) 'Loo' blows in the North western India.

Ans. (a)

Q.13. Examine which of the following is a cause of rainfall at coastal region of Tamil Nadu in the winter season?

- (a) South west monsoon
- (b) North east monsoon
- (c) Temperate cyclones
- (d) Local winds

Ans. (b)

Q.14. Which of the following is the base of Koeppen's Scheme of climatic classification?

- (a) Monthly values of temperature
- (b) Monthly values of precipitation
- (c) Monthly values of temperature and precipitation
- (d) Monthly value of local weather

Ans. (c)

Q.15. Which of the following gases, is not green house gas?

- (a) Carbon dioxide
- (b) Chlorofluoro carbons
- (c) Methane
- (d) Oxygen

Ans. (d)

Q. 16. Assertion (A) Agricultural prosperity of India depends very much on timely and adequately distributed rainfall.

Reason (R) If rain fails agriculture is adversely affected.

- (A) 'A' and 'R' both are correct, 'R' is correct explanation of 'A'
- (B) Both A and R are correct but 'R' is not correct explanation of 'A'
- (C) Only 'A' is correct
- (D) Only 'R' is correct

Ans. (A) 'A' and 'R' both are correct, 'R' is correct explanation of 'A'

Q. 17. Which of the following is not responsible for global warming?

- (a) Thundering clouds
- (b) Industrialisation
- (c) Volcanic Activities
- (d) Polluting gases in atmosphere

Ans. (a)

Q. 18. Fill in the blanks :

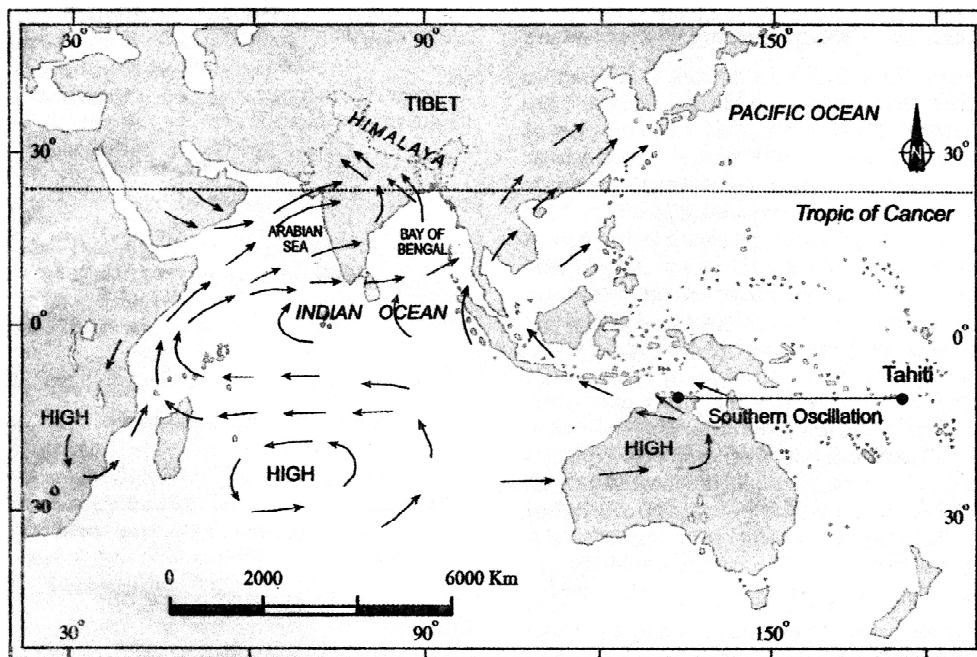
- (i) As compared the land mass, water heats up or cools _____.
- (ii) Coastal areas have _____ climate.
- (iii) Places in the mountains are _____ than places on the plain.
- (iv) Northern part of the India lies in _____ and _____ zone.
- (v) The retreating south-west monsoon. Seasons is marked by _____ and _____ .

(vi) Tropical cyclones originate over the _____ and _____ .

(vii) The easterly jet streams steers the tropical depression into _____ .

Ans. (i) Slowly (ii) equable (iii) Cooler (iv) Subtropical, Temperate (v) Clearskies and rise in temperature (vi) Bay of Bengal, The Indian ocean (vii) India

Summer Monsoon Winds : Surface Circulation



Short Answer Type Questions

Q.1. Analyse the factors related to air pressure and wind.

Ans. (i) Distribution of air pressure and winds on the surface of the earth.

(ii) Upper air circulation caused by factors controlling global weather and the inflow a different air masses and jet streams.

- (iii) Inflow a western cyclones generally known as disturbances during the winter season and tropical depressions during the south-west monsoon period into India, creating weather conditions favourable to rainfall.

Q.2. What is break in the monsoon? Mention its causes and impacts.

- (a) During the South monsoon period after having rains for a few days, if rains fails to occur for one a more weeks.
- (b)
 - (i) In northern India, rains are likely to fail if the rain-bearing storms are not very frequent along the monsoon through the I.T.C.Z. over this region.
 - (ii) Over the west coast the dry spells are associated with days when winds blow parallel to the coast.

Q.3. Why does Mawsynram (Meghalaya) receive the highest amount of rainfall in the world?

- Ans.
 - (i) One branch of monsoon winds of the Bay of Bengal moves up the Brahmaputra valley in the north and the north east, causing wide spread rains.
 - (ii) Its sub branch strikes the Garo and Khasi hills of Meghalayas mawsynram, located on the crest of khasi hills receives the highest average annual rainfall in the world.

Q.4. Why the Tamil Nadu coast remains dry during the monsoon season? In which season it receives rainfall?

- Ans.
 - (i) The Tamil Nadu coast is situated parallel to the Bay of Bengal branch of South west monsoon.
 - (ii) It lies in the rain shadow area of the Arabian sea branch of the South-west monsoon.

- (iii) It receives rainfall in winter season, by north east monsoon when it crosses over Bay of Bengal, picks up moisture and causes torrential rainfall over the Tamilnadu coast.

Q.5. Mention the arrival process of South-west monsoon in Indian sub-continent?

- Ans.
- (i) As a result of rapid increase of temperature in May over the north-western plains the low pressure condition over there gets further intensified, powerful enough to attract the trade winds of southern hemisphere coming from the Indian ocean.
 - (ii) These South east trade winds cross the equator and enter the Bay Bengal and the Arabian sea, only to be caught up in the air circulation over India passing over the equatorial warm currents and bring with them moisture in abundance, follow a south westerly direction.
 - (iii) The rain in the south west monsoon season begins rather abruptly, the first rain brings down the temperature. This sudden onset of the moisture laden winds associated with violent thunder and lightning is termed as the burst of monsoon.

Q.6. What are the main reasons for the excessive cold in north India during the season?

- Ans.
- (i) States like Punjab, Haryana and Rajasthan being far away from the moderating influence of sea experience continental climate.
 - (ii) The snow fall in the nearby Himalayan ranges creates cold wave situation and
 - (iii) Around February the cold wind coming from the Caspian sea and Turkmenistan bring cold wave along with frost and fog over the north western parts of India.

Q.7. Explain the utility of rain-bearing systems and highlights the factors of intensity of rainfall over the west coast of India.

Ans. (A) (i) There seems to be two rain bearing systems in India, first originate in the Bay of Bengal causing rainfall over the plains of north India.

(ii) Arabian sea current of the south-west monsoon is the second which brings rain to the west coast of India, Much of the rainfall along the western ghats is orographic.

(B) Factors of the intensity of rainfall over the west coast of India.

(i) The offshore meteorological conditions.

(ii) The position of the equatorial jet stream along the eastern coast of Africa.

Q.8. What is mango shower? Explain its utility.

Ans. (i) Towards the end of summer there are premonsoon showers a common phenomena in Kerala and coastal areas of Karnataka. They are known as mango showers locally.

(ii) It is very useful in the early ripening of mangoes.

Q.9. Explain the nature and utility of nor westers.

Ans. (i) These are dreaded evening thunderstorms in Bengal and Assam.

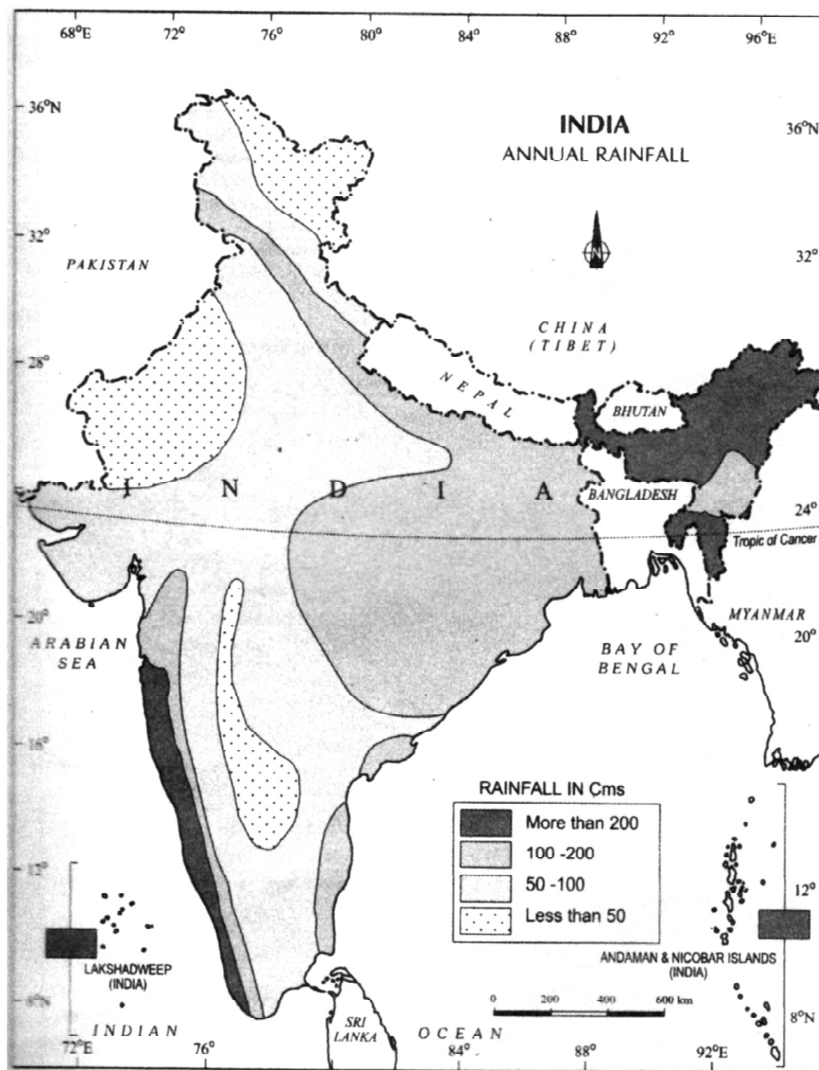
(ii) Their notorious nature can be understood from the local nomenclature of Kalbaisakhi, a calamity of the month of Baisakh.

(iii) These showers are useful for tea, jute and rice cultivation.

Long Answer Type Questions

Q.1. What is Jet Stream? Evaluate its influences on Indian weather cycle.

Ans (a) All of western and central Asia remains under the influence of westerly winds along the altitude of 9 -13 km from west to east. These winds blow across the Asian continent at latitudes north of the Himalayas roughly parallel to the Tibetan highlands.



- (b) (i) Jet stream get bifurcated, one blows to the north of the Tibetan highlands where is southern branch blows in an eastward direction south of the Himalayas, its mean position at 25°N in Feb at 200–300 mb level.
- (ii) It is believed that this southern branch of the jet stream exercises an important influence on the winter weather in India.
- (iii) The western cyclone disturbances which enter the Indian sub-continent from the west and north-west during the winter months are brought into India by the westerly jet stream.
- (iv) The easterly jet stream steers the tropical depression into India and play an important role in the distribution of monsoon rainfall over the Indian sub-continent.

Q.2. Monsoon is a gamble for Indian farmers. Substantiate the statement.

or

Monsoon is that axis around which revolves the entire agriculture cycle of India. Substantiate.

- Ans. (i) It is because about 64 percent people of India depend on agriculture their livelihood and agriculture itself is based on south-west monsoon.
- (ii) All the parts of the nation, except Himalayas have temperature above the threshold level to grow the crops or plants throughout the year.
- (iii) Regional variations in monsoon climate help in growing various types of crops.
- (iv) Variability of rainfall brings droughts or floods every year in some

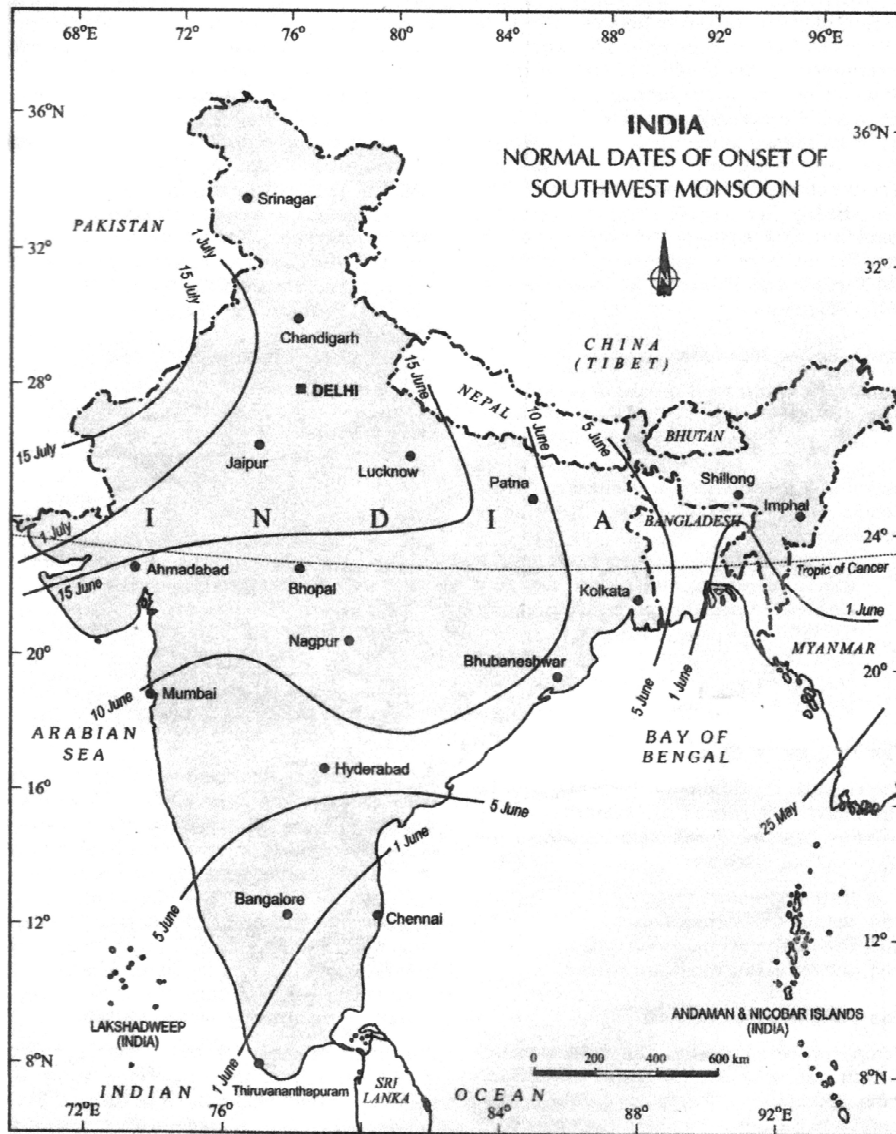
parts of the country.

- (v) Agricultural prosperity of India depends very much on timely and adequately distributed rainfall. If it fails agriculture is adversely affected specially in those regions where means of irrigation are not developed.
- (vi) Winter rainfall by temperate cyclones in north India is highly beneficial for rabi crops.
- (vii) Regional climate variation in India is reflected in the vast variety of food, clothes and house types.

Q.3. Mention the major features of monsoonal rainfall in India?

- Ans.
- (i) Rainfall received from the southwest monsoons is seasonal in character, it occurs between June and September.
 - (ii) Monsoonal rainfall is governed by relief or topography, the windward side of the western ghats register a rainfall of over 250 cm. The heavy rainfall in the north eastern states can be attributed to their hill ranges and the eastern Himalayas.
 - (iii) It has a declining trend with increasing distance from the sea, Kolkata receives 119 cm during the South west monsoon Patna 105 cm, Allahabad 76 cm Delhi 56 cm.
 - (iv) The summer rainfall comes in a heavy down pour leading to considerable run off and soil erosion.
 - (v) Monsoons play a pivotal role in the agrarian economy of India because over three fourth of the total rain in the country is received during the South west monsoon seasons.

(vi) Its spatial distribution is also uneven ranges from 12 cm to more than 250cm.



Q. 4. There is mountain rainfall in India. Explain with example the effects of relief on the distribution of rainfall.

Ans. Western ghats and western coastal plain

- (i) One branch of Arabian sea monsoon obstructed by the western ghats. These winds climb the slopes of western ghats, they become cool, the wind ward side of the Sahyadris and western coastal plain receive very heavy rainfall between 250 cm-400 cm.
- (ii) Rain shadow area after crossing the western ghats, these winds descend and get heated up, reduces humidity. In the winds result these winds, cause little rainfall east of the western ghats.
- (iii) Heavy rainfall in Meghalaya : A branch of Bay of Bengal strikes the Garo and Khasi hills of Meghalaya. It provides highest average annual rainfall in the world.
- (iv) Less amount of rainfall in Rajasthan : The third branch due to Aravalis of the Arabian monsoon wind strikes the Saurashtra peninsula and the Kachch, when it passes over west Rajasthan and along the Aravalis in result only a scanty rainfall.
- (v) Affect of Himalayas on the direction of monsoonal winds a branch monsoon winds of Bay of Bengal splits into two, under the influence of the Himalays and the thermal low is north-west India. It could not pass the Himalayan range and moves towards west and loses its humidity gradually.

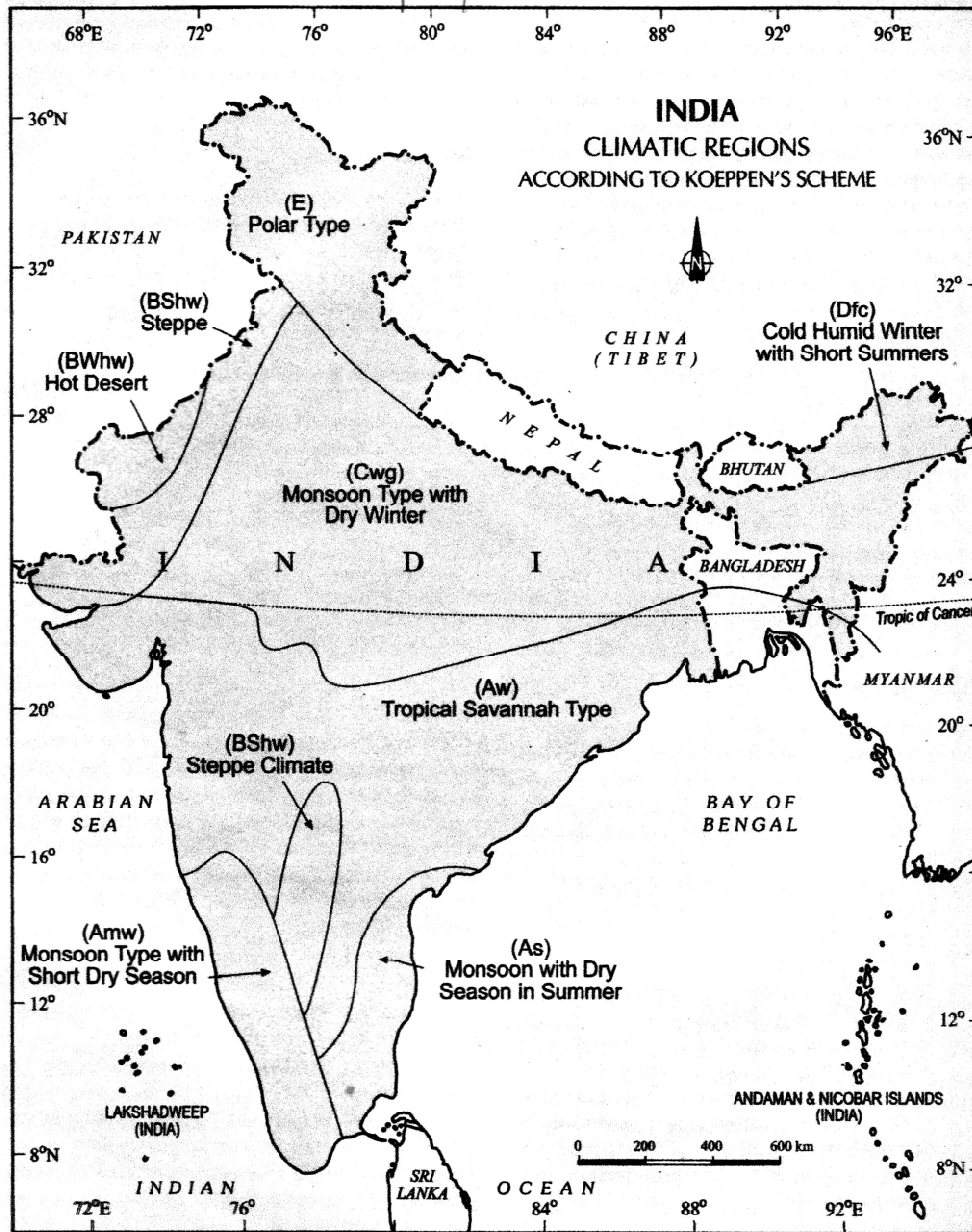
Q.5. Evaluate the factors determining the climate of India related to location and relief.

Ans. (i) Latitude: the tropic of cancer passes through the central part of India in east west direction. Northern parts of the country lies in sub-tropical and temperate zone and the part lying south of the

Tropic of cancer falls in the tropical zone. It experiences high temperature through out the year. North part experiences extreme climate with high daily and annual range of temperature.

- (ii) The Himalayan Mountains: The lofty Himalayan act as an influencive climate divide, it provides an invincible shield to protect the sub continent from the cold northern winds, which originate near the arctic circle and blow across central and eastern Asia. It traps the monsoon winds facing them to shed their moisture with the sub continent.
- (iii) Distribution of Land and Water : India is flanked by the Indian ocean on three sides in the south and girdled by a high and continuous mountain wall in the north. Water heats up or cools down slowly as compared to the land mass which creates different air pressure zones in different seasons in and the Indian subcontinent.
- (iv) Distance from the Sea : Large coastal areas have an equable climate interior parts are far away from the moderating influence of the sea these have extremes of climate. The people of Mumbai and the konkan coast have hardly any idea of extremes of temperature and the season rhythm of weather whereas the seasonal contrast in weather at Delhi, Kanpur etc.
- (v) Altitude : Temperature decreases with height Due to thin air, places in the mountain are cooler then places on the plains, as Agra and Darjiling are located on the same latitude but temperature of January in Agra is 16°C whereas it is only 4°C in Darjiling.
- (vi) Relief : The physiography or relief of India affects the temperature air pressure, direction and speed of wind and the amount and distribution of rainfall and Assam receive high rainfall dur-

ing June-September. Whereas the southern plateau remains dry due to its leeward situation along the westenghats.



Q. 6. What are the climatic regions of India according to Koeppens scheme?

Ans.

<i>Type of Climate</i>	<i>Areas</i>
Amw – Monsoon with short by reason.	West coast of India south of Goa.
As – Monsoon with dry summer	Coromandel coast of Tamil Nadu.
Aw – Tropical savannah	Most of the Peninsular plateaus, south of the Tropic of Cancer.
Bwhw – Semi-arid steppe climate	North-western Gujarat, some parts of western Rajasthan and Punjab.
Bwhw – Hot desert	Extreme western Rajasthan.
Cwg – Monsoon with dry winter	Ganga plain, eastern Rajasthan, northern Madhya Pradesh, most of North-east India.
Dfc – Cold humid winter with short summer	
E – Polar type	Arunachal Pradesh Jammu and Kashmir, Himachal Pradesh and Uttarakhand.

Q.7. Analyse the climatic types identified by Koeppen in India.

Ans. Koeppen identified five major climatic types, names as under:

- (i) Tropical climates, where mean monthly temperature throughout the year is over 18°C.
- (ii) Dry climates, where precipitation is very low in comparison to temperature, and hence, dry. If dryness is less, it is semi-arid (S); if it is more, the climate is arid (W).

- (iii) Warm temperate climates, where mean temperature of the coldest month is between 18°C and minus 3°C.
- (iv) Cool temperate climates, where mean temperature of the warmest month is over 10°C, and mean temperature of the coldest month is under minus 3°C.
- (v) Ice climates, where mean temperature of the warmest month is under 10°C.

Q.8. Which gases are called green house gases? Analyse their effects–

Ans. Carbon dioxide, released to the atmosphere in large quantities by burning of fossil fuel. Others, methane, chlorofluorocarbons, nitrous oxide are known as green house gases.

Effects:

- (i) These gases are better absorbers of long wave radiation than carbon-dioxide are more effective at enhancing the green house effect.
- (ii) These gases have been contributing to global warming.
- (iii) The polar ice caps and mountain glaciers would melt and the amount of water in the oceans would increase.
- (iv) Global temperature will increase by about 2°C, which cause many other changes – rise in sea level, as result of melting of glaciers and sea-ice due to warming.

Q.9. What is El-Nino? What are its results? Mention its impacts on Indian Monsoon System.

Ans. (A) El-Nino is a complex weather system that appears once every three to seven years, bringing drought, floods and other weather extremes to different parts of the world.

(B) Results:

- (i) the distortion of equatorial atmospheric circulation;
- (ii) irregularities in the evaporation of sea water;
- (iii) reduction in the amount of planktons which further reduces the number of fish in the sea.

(C) El-Nino and the Indian Monsoon: El-Nino is used in India for forecasting long range monsoon rainfall. In 1990-91, there was a wild El-Nino event and the onset of southwest monsoon was delayed over most parts of the country ranging from five to twelve days.

Q.10. "Most parts of India do not have rainfall in the winter season, however there are some exceptions to it". Explain the statement with example.

- Ans. (i) In north western India, some weak temperate cyclones from the mediterranean sea cause rainfall in Punjab, Haryana, Delhi and western Uttar Pradesh.
- (ii) The amount is meagre but highly useful for Rabi crops.
- (ii) The precipitation is in the form of snowfall in the lower Himalayas, this snow that sustains the flow of water in the Himalyan rivers during the summer months.
- (iv) The precipitation goes on decreasing from west to east in the plains and from north to south in the mountains.
- (v) Central parts of India and northern parts of Southern Peninsula get winter rainfall occasionally.
- (vi) Arunachal Pradesh and Assam in the north eastern parts of India have rains.

- (vii) During october and november, north east monsoon whenever crossing over the Bay of Bengal, picks up moisture and causes torrential rainfall over the Tamilnadu coast, Southern Andhra Pradesh, South East Karnataka and South East Kerala.

Source Based Questions

- Q.1. Read the source given below carefully and answer the questions that follow:

Inter Tropical Convergence Zone (ITCZ)

The Inter Tropical Convergence Zone (ITCZ) is a low pressure zone located at the equator where trade winds converge, and so, it is a zone where air tends to ascend. In July, the ITCZ is located around 20°N–25°N latitudes (over the Gangetic plain), sometimes called the monsoon trough. This monsoon trough encourages the development of thermal low over north and northwest India. Due to the shift of ITCZ, the trade winds of the southern hemisphere cross the equator between 40° and 60°E longitudes and start blowing from southwest to northeast due to the coriolis force. It becomes southwest monsoon. In winter, the ITCZ moves southward, and so the reversal of winds from northeast to south and southwest, takes place. They are called northeast monsoons.

- (A) What is ITCZ?
- (i) A region of low pressure
 - (ii) A region of high pressure
 - (iii) A region develops at tropic of cancer
 - (iv) A region develop as tropic of capricorn

Ans. (i)

- (B) Which winds are found here?

- (i) Westerlies are found here
- (ii) Easterlies are found here
- (iii) Trade winds
- (iv) None of the above

Ans. (iii)

(C) What is encouraged by the monsoon trough over north, north west India?

- (i) Thermal low
- (ii) Thermal high
- (iii) High pressure belt
- (iv) None of these

Ans. (i)

(D) Which force is mentioned here?

- (i) Centrifugal force
- (ii) Coriolis force
- (iii) Centripetal force
- (iv) None of these

Ans. (ii)

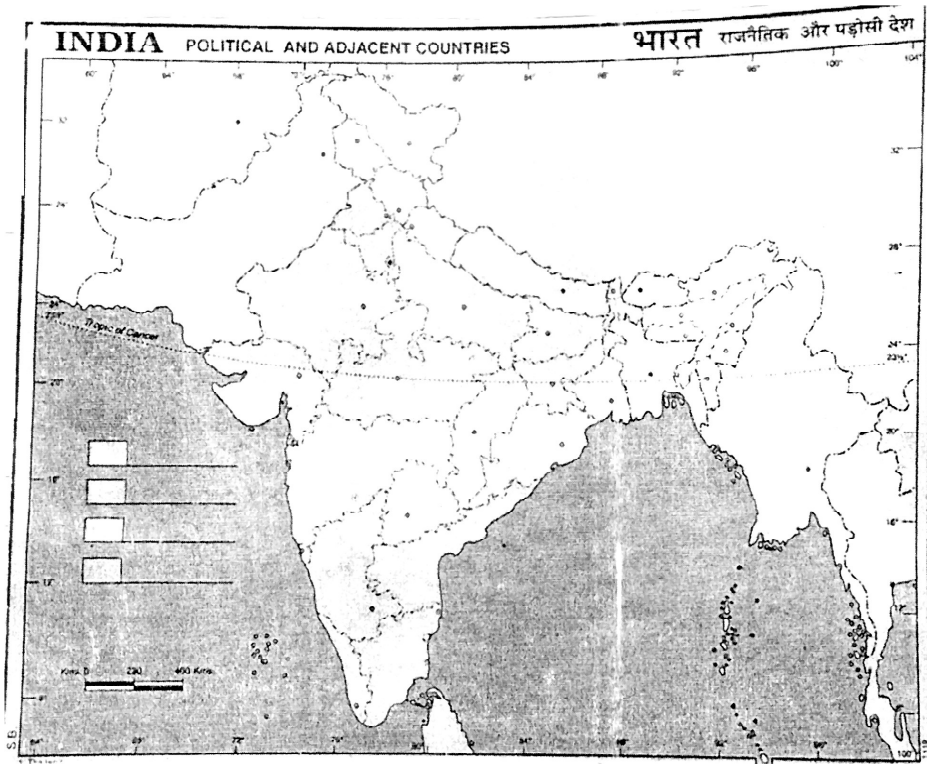
Map Work

Q.1. Show the distribution of following in an outline political map of India.

- (A) Area of Rain fall during winter (South India)
- (B) A place in India of lowest temperature
- (C) The Isohytes of 100 cm
- (D) Area of rainfall during winter (North India)
- (E) Area of Dfc type climate

(F) Area of As type climate

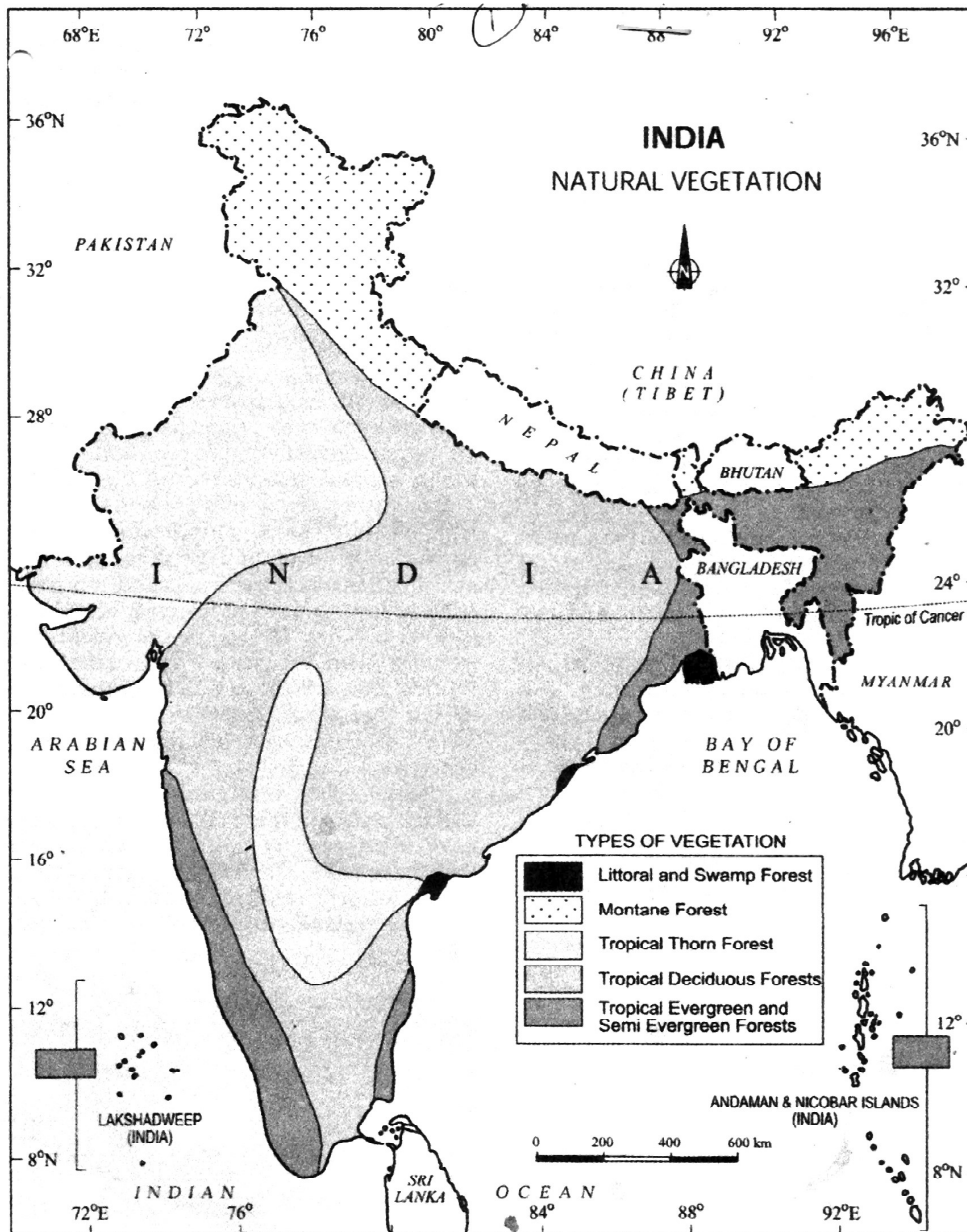
(G) Area of E type climate



Chapter-5

Natural Vegetation

- India is a land of great variety of natural vegetation.
- Himalayan height are marked with temperate vegetation, the western ghats and the Andaman Nicobar islands have tropical rain forests, the deltaic regions have tropical forests and mangroves, the desert and semi desert areas of Rajasthan are known for cactii, a wide variety of bushes and thorny vegetation.
- Hilly topography and heavy rainfall are good for forest growth.
- On the basis of predominant vegetaion type and climatic regions. Indain forests are divided into the five groups.
 - (i) Tropical evergreen and semi evergreen forests.
 - (ii) Tropical deciduous forests
 - (iii) Tropical thorn forests
 - (iv) Montane forests
 - (v) Littoral and swamp forests
- According to state records, the forest area covers 23.28 percent of the total land area of the country.
- According to India state of forest report 2011, the actual forest cover in India is only 21.05 percent.
- The share of dense and open forests are 12.29 and 8.7 percent respectively.



- Lakshadweep has zero percent forest area. Andaman and Nicobar islands have 86.93 percent.

- Most of the forests in Punjab and Haryana have been cleared for cultivation.
- Most of the states with less than 10 percent of the forest area lie in the north and north western part of the country. These are Rajasthan, Gujarat, Punjab Haryana and Delhi.
- States with 10-20 percent forest area are Tamil Nadu and West Bengal.
- North eastern states have more than 30 percent of the land under forest.
- Gujarat, Rajasthan and Haryana are the Semi arid areas.
- The Govt. of India proposed to have a nation wide forest conservation policy, and adopted a forest policy in 1952, modified in 1988.
- A comprehensive wildlife act was enacted in 1972. It provides the main legal framework for conservation and protection of wild life in India. It was amended in 1991.
- Project tiger has been implemented since 1973 project elephant was launched in 1992.
- A biosphere reserve is a unique and representative ecosystem of terrestrial and coastal areas.

MCQ, Objective, Fill In The Blanks

Q.1. Which one of the following is not a type of forest?

- (a) Tropical deciduous forests (b) Islands forests
 (c) Montane forests (d) Littoral and sulamp forests

Ans. (b)

Q.2. Which one of the following is not a type of social forestry?

- (a) Green forestry (b) Farm forestry
(c) Urban forestry (d) Rural forestry

Ans. (d)

Q.3. With which forest the teak tree is associated?

- (a) Tropical thorn forests (b) Montane forests
(c) The moist deciduous forests (d) Dry deciduous forests

Ans. (c)

Q.4. The southern mountain forests are not found in:

- (a) Western ghats (b) Vindhya mountain range
(c) Nilgiris (d) Rajmahal hills

Ans. (d)

Q.5. Match column II with column I

- | Column I | Column II |
|----------------------------------|---|
| (i) Nanda Devi Biosphere Reserve | (a) Ganga's delta |
| (ii) Mannar Biosphere Reserve | (b) The topography is extremely varied ranging from an altitude of 250 m to 260 m |
| (iii) Nilgiris Biosphere Reserve | (c) 1992 |
| (iv) Project Tiger | (d) Uttrakhand |
| (v) Project Elephant | (e) South-East coast |
| (vi) Sunderban Biosphere Reserve | (f) 1973 |

Ans. (i) - (d), (ii) - (e), (iii) - (b), (iv) - (f), (v) - (c), (vi) - (a)

Q.6. Sandal wood (trees) are found in

Ans. Tropical deciduous forests

Q.7. are found in Andaman and Nicobar islands.

Ans. Tropical evergreen and semi evergreen forests.

Q.8. Tendu, Palas, Bel and axlewood trees are the examples of which of the following forests?

- (a) Tropical thorn forests
- (b) Montane forests
- (c) Tropical deciduous forests
- (d) Tropical evergreen and semi evergreen forests

Ans. (c)

Q.9. Examine which type of following expression the plants give in the tropical thorn forests

- (a) Very long
- (b) Remain evergreen
- (c) Like scrub
- (d) Like a grass land

Ans. (c)

Q.10. Which of the following forests have a part landscape in northern Indian plain?

- (a) Mountain forests
- (b) Tropical thorn forests
- (c) Tropical Deciduous forests
- (d) Littoral and sulamp forests

Ans. (c)

Q.11. Examine which of the following causes of the very scanty vegetation cover is found in the western and southern part of Rajasthan?

- (a) Low rainfall and overgrazing
- (b) Rainfall more than 200 cm
- (c) Annual rainfall more than 22 cm
- (d) Rainfall more than 70 cm

Ans. (a)

Q.12. Arrange the correct sequence of column II against the states of column I.

- | Column I | Column II |
|---------------------------------|-------------------------------|
| (i) Andaman and Nicobar Islands | 1. Dry Deciduous forest |
| (ii) Odisha | 2. Mountain forests |
| (iii) Bihar | 3. The most deciduous forests |
| (iv) Kerala | 4. Tropical evergreen forests |
- (a) (i) - 4, (ii) - 3, (iii) - 1, (iv) - 2
 - (b) (ii) - 2, (iii) - 3, (iv) - 4, (i) - 1
 - (c) (iv) - 1, (iii) - 2, (ii) - 3, (i) - 4
 - (d) (i) - 3, (ii) - 4, (iii) - 1, (iv) - 2

Ans. (a)

Q.13. Which of the following project has been launched by govt. of India to conserve the national animal?

- (a) Elephant project
- (b) Project tiger
- (c) Crocodile breeding project
- (d) Project hangul

Ans. (b)

Q. 14. The protection of wildlife has long tradition in India. The positive impact of wildlife conservation on wildlife will be:

- (a) Wildlife will independent
- (b) Habitat of wildlife be extended
- (c) The number of wildlife be increased
- (d) Wild life get protection

Ans. (a)

Q. 15. Which one the following is the first biosphere reserve in India?

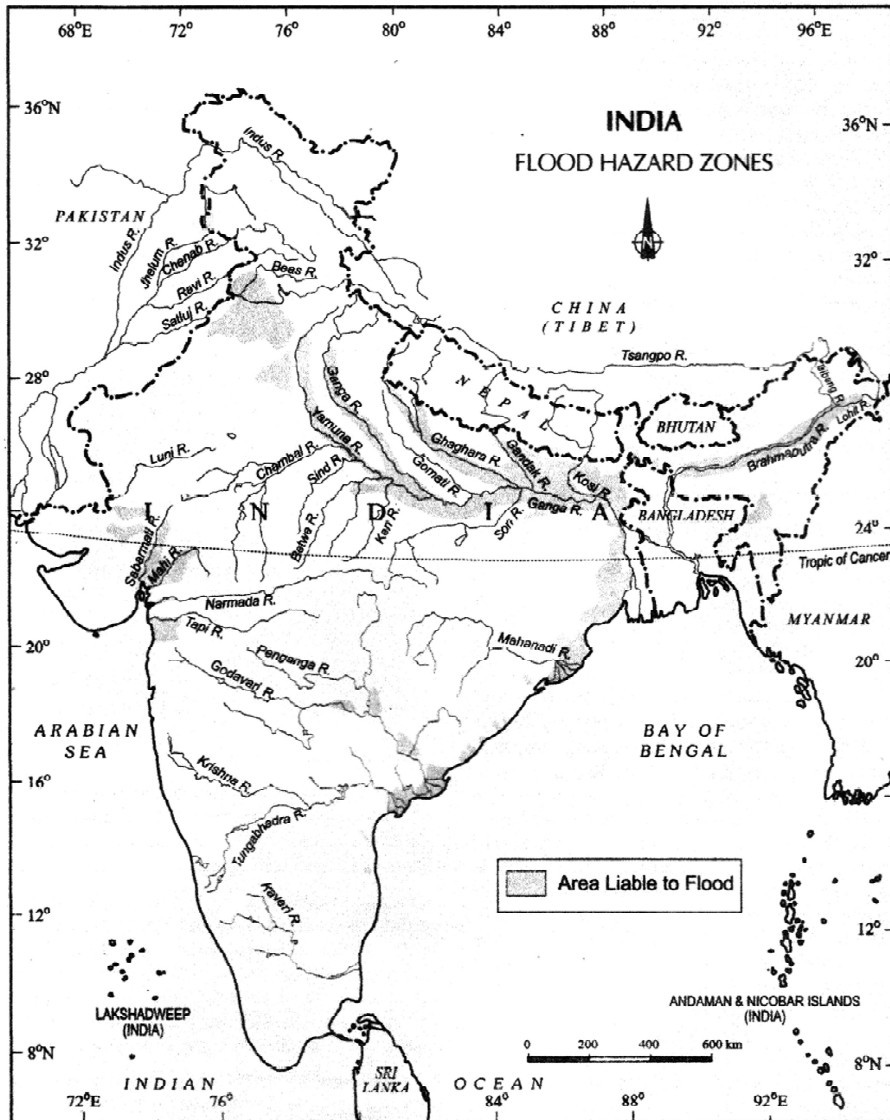
- (a) Nilgiri Biosphere reserve
- (b) Nanda Devi Biosphere reserve
- (c) Sundarban Biosphere reserve
- (d) Gulf of Mannar Biosphere reserve

Ans. (a)

Q. 16. Fill in the blanks

- (i) Tropical evergreen and semi evergreen forests are found in
- (ii) The most deciduous forests are found where annual rainfall records
- (iii) The dry deciduous forests are found where rain fall ranges between to
- (iv) Areas which receive rainfall less than 50 cm there are found.
- (v) The temperate forests in the nilgiris are called

- Ans. (i) Warm and humid (ii) 100-200 cm
 (iii) 70-100 cm (iv) Tropical thorn forests
 (v) Sholas



Q.17. Assertion (A) Forest provide numerous direct and indirect advantages to our economy and society.

Reason (R) Conservation of forest is of the vital importance to the survival and prosperity of human kind.

- (A) A and R both are correct 'R' is correct explanation of 'A'
- (B) Both 'A' and 'R' correct but 'R' is not correct explanation of 'A'
- (C) Only 'A' is correct
- (D) Only 'R' is correct

Ans. (A) A and R both are correct 'R' is correct explanation of 'A'

Short Answer Type Question

Q.1. What is natural vegetation? under what climatic conditions are tropical evergreen forests develop?

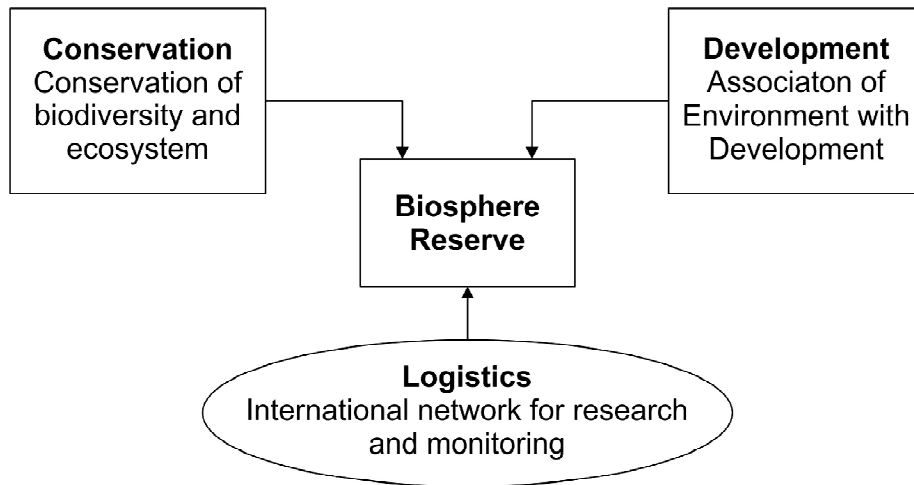
Ans. Natural vegetation refers to a plant community that has been left undisturbed over a long time, so as to allow its individual species to adjust themselves to climate and soil conditions as fully as possible.

- (i) These forest are found in warm and humid areas in these areas annual precipitation of over 200 cm and mean annual temperature above 22° C.
- (ii) These forests are found in the western slope of the western ghats, hills of the north eastern region and the Andaman and Nicobar Islands.

Q.2. What is biosphere reserve? Mention its objectives.

Ans. A biosphere reserve is a unique and representative ecosystem of terrestrial and coastal areas which are internationally recognised

within the framework of UNESCO's Man and Biosphere Programme.
(MAB)



Objectives : The biosphere reserve aims at achieving the three objectives.

- (a) Conservation : Conservation of biodiversity and ecosystem
- (b) Development : Association of environment with development.
- (c) Logistics : International network for research and monitoring.

Q.3. Mention tropical deciduous forests.

Ans. (a) These forests are found in India in large scale. They spread over the regions which receive rainfall between 70-200 cm

(b) These are divided into moist and dry deciduous.

- (i) The moist deciduous forests are found in the north eastern states along the foot hills of Himalayas, eastern slope of the western ghats and odisha. Teak, sal, shisham, hurra, mahua, amla, semul etc. are the main species of these forests, rainfall between 100-200 cm.

(ii) Dry deciduous forests covers large areas of the country rainfall ranges is 70-100cm. These forests are found in rainier areas of the peninsula and the plains of Uttar Pradesh and Bihar. Tendu, Palas, amaltas, bel, khair, axlewood are the common trees of these forests.

Q.4. What are littoral and swamp forests? Explain the importance of these forests in India.

Ans. These forests are grown in wetlands. India has a rich variety of wetland habitats thus the natural vegetation is called littoral and swamp forests.

Importance : In India, the total area of wetland is 3.9 million hect ares. Chilka and Keoladeo national park are the protected as water fowl habitats.

- These forests give shelter to a wide variety of birds and animals.
- In the Ganga Brahmaputra delta, the tidal forests are known as Sunderbans.

Q.5. When was the wildlife act enacted? What are its objectives?

Ans. (a) The wildlife act was enacted in 1972.

(b) Objectives:

- (i) To provide protection to the endangered species listed in the schedule of the act.
- (ii) To provide legal support to the conservation areas of the country classified as national parks, sanctuaries and closed lands.

Q.6. Mention any three features of tropical thorn forests.

- Ans. (1) Tropical thorn forests occur in the areas which receive rainfall less than 50 cm.
- (2) These consist of a variety of grasses and shrubs. It includes semi-arid areas of south west Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh and Uttar Pradesh.
- (3) In these forests, plants remain leafless for most part of the year and give an expression of scrub vegetation. Important species found are babool, ber, wild date palm, kair, neem, khejri, palas. Tussocky grass grows upto a height of 2 m as the under growth.

Q.7. Evaluate the features of community forestry.

- Ans. (1) Community forestry involves the raising of trees on public or community land such as village pasture and temple land, roadside, canal bank, strips along railway lines, and schools etc.
- (2) Community forestry programme aims at providing benefits to the community as a whole.
- (3) Community forestry provides a means under which the people of landless classes can associate themselves in tree- raising and thus, get those benefits which otherwise are restricted for land owners.

Long Answer Type Questions

Q.1. When was a forest policy adopted? What were its main aims?

- Ans. (a) The Government of India adopted a forest policy in 1952 and further modified in 1988 emphasising the sustainable forest management in order to conserve and expand forest reserve on the one hand and to meet the needs of local people.

The forest policy aimed at:

- (i) Bringing 33 percent of the geographical areas under forest cover.
- (ii) Maintaining environmental stability and to restore forests where ecological balance was disturbed.
- (iii) Conserving the natural heritage of the country, its biological diversity and genetic pool.
- (iv) Checks soil erosion, extension of the desert lands and reduction of floods and droughts.
- (v) Increasing the forest cover through social forestry and afforestation on degraded level.
- (vi) Increasing the productivity of forests to make timber, fuel, fodder and food available to rural population dependant on forests and encourage the substitution of wood.
- (vii) Creating of massive peoples movement involving women to encourage planting of trees, stop felling of trees and thus, reduce pressure on the existing forest.

Q.2. What is social forestry? Explain its three categories with examples.

- Ans.
- Social forestry means the management and protection of forests and afforestation on barren lands with the purpose of helping in the environmental, social and rural development.
 - The national commission on agriculture (1976) has classified social forestry into three categories. These are urban forestry, rural forestry and farm forestry.
 - Urban forestry pertains to the raising and management of trees on public and privately owned lands in and around urban centres such as green belts, parks, roadside avenues, industrial and commercial green belts etc.

- Rural forestry lays emphasis on promotion of agro- forestry and community forestry.
- Agro forestry is the raising of trees and agriculture crops on the same land inclusive of the waste patches.
- It combines forestry with agriculture, altering the simultaneous production of food, fodder, fuel, timber and fruit.

Q.3. Analyse the important reasons of the declining of wildlife in India?

Ans. Some of the important reasons of the declining of wildlife are as follows:

1. Industrial and technological advancement brought about a rapid increase in the exploitation of forest resources.
2. More and more lands were cleared for agriculture, human settlement, roads, mining, reservoirs etc.
3. Pressure on forests mounted due to lopping for fodder and fuel wood and removal of small timber by the local people.
4. Grazing by domestic cattle caused an adverse effect on wildlife and its habitat.
5. Hunting was taken up as a sport by the elite and hundreds of wild animals were killed in a single hunt. Now commercial poaching is rampant.
6. Incidence of forest fire.

Q.4. Mention the major characteristics of tropical evergreen and deciduous forest.

Ans. (A) Tropical evergreen forests:

- Tropical evergreen forests are well stratified, with layers closer to the ground and are covered with shrubs and creepers with short structured trees followed by tall variety of trees.

- Trees in these forests reach great heights upto 60 m or above.
- There is no definite time for trees to shed their leaves, flowering and fruition. Rosewood, mahogany, aini, ebony are the main species.

(B) Deciduous forests:

- As the dry season begins, the trees shed their leaves completely and the forest appears like a vast grassland with naked trees all round.
- Tendu, palas, amaltas, bel etc are the common trees of these forests.

Q.5. Examine the fauna and flora of Nilgiri biosphere reserve.

Ans. (1) It embraces the sanctuary complex of Wyanad, Nagarhole, Bandipur and Mudumalai, the upper Nilgiri plateau, silent valley and the Siruvani hills.

(2) The nilgiri biosphere reserve possesses different habitat types, unspoilt areas of natural vegetation types with several dry scrubs, dry and moist deciduous, semi-evergreen and wet evergreen forests, evergreen scholas, grasslands and swamps.

(3) It includes the largest known population of two endangered animal species namely the Nilgiri tahr and the lion-tailed macaque.

(4) The largest south Indian population of elephant, tiger, gaur, sambar, and chital as well as good number of endemic and endangered plants are also found in this reserve.

(5) The habitat of a number of tribal groups remarkable for their traditional modes of harmonious use of the environment are also found here.

Q.6. Explain the importance of northern mountain forest.

Ans. (i) The Himalayan ranges show a succession of vegetation from the tropical to the Tundra which change in with the altitude.

- (ii) Between 1500-1750 m pine forests are well-developed with chir pine as a very useful commercial tree.
- (iii) Deodar a highly valued endemic species grows mainly in the western part of the Himalayan range. It is a durable wood used in construction activity.
- (iv) The Chinar and the walnut sustain the famous Kashmir handi-crafts.
- (v) Altitude of 2225-3048 m at many places temperate grassland are found.
- (vi) These pastures are used extensively for transhumance by tribes like the gujjars, the Bakarwala; the Bhotiyas and the Gaddis.

Q.7. Explain the Southern mountain forests with example and areas.

- Ans.
- (i) These forest are found in three distinct areas of peninsular India-viz- the western Ghats, the Vindhyas and the Nilgiris.
 - (ii) They are closer to the tropics and only 1500 m above the sea level, vegetation is temperate in the higher regions and sub-tropical on the lower regions of the western ghats especially in Kerala, Tamilnadu and Karnataka.
 - (iii) The temperate forests are called sholas in the Nilgiris, Anaimalai and Palani hills.
 - (iv) Magnolia, laural, cinchona and wattle trees are of economic significance.
 - (v) Such forests are also found in the Satpura and the Maikal ranges.

CASE-STUDY

Project Tiger

Project tiger has been implemented. Since 1973, the main objective of the scheme is to ensure maintenance of viable population of tigers in India for scientific, aesthetic, cultural and ecological values and to preserve areas of biological importance as natural heritage for the benefit, education and enjoyment of the people; the project tiger was lanchd in Nine tiger reserves. Which has now increased to 41 tiger reserves.

Q.1. What is the main objective of project tiger?

Ans. To ensure maintance of viable population of tiger in India.

Q.2. In howmany tiger reserves: The project tiger was lanchd initially?

Ans. Nine

Q.3. How many tiger reserves are in India now?

Ans. 41

Source Based Questions

Read the source (forest and life) given below carefully and answer the questions that follow:

Forests and Life

To a vast number of tribal people, the forest is a home a livelihood, their very existence. it provides them food, fruits of all kinds, edible leaves, honey. nourishing roots and wild game. it provides them with material to build their houses and items for practising their arts. the importance of forests in tribal economy is well known. it is commonly believed that the tribal communities live in harmony with nature and protect forests. out of a total of 593 districts 188 have been identified as tribal districts. the tribal districts account for

about 59.61 per cent of the total forest cover of the country whereas the geographical area of 188 tribal districts forms only 33.63 per cent of the total geographical area of the country. It demonstrates that tribal districts are generally rich in forest cover.

Forest and tribals are very closely related. The age-old knowledge of tribals regarding forestry can be used in the development of forests. rather than treating tribals as minor forest produce collectors they should be made growers of minor forest produce and encouraged to participate in conservation.

Q.1. What is forest for tribal people?

- (a) To get leaves and shade
- (b) Forest is a home
- (c) Source of clean air
- (d) None of these

Ans. (b)

Q.2. What is importance of forests for tribal people?

- (a) Forest as permanent habitats
- (b) Forests as lifeline
- (c) Source of sustenance and livelihood for tribal community
- (d) None of these

Ans. (c)

Q.3. What is the status of tribal districts in the context of forests?

- (a) Poor
- (b) Very poor
- (c) Rich
- (d) Neither rich nor poor

Ans. (c)

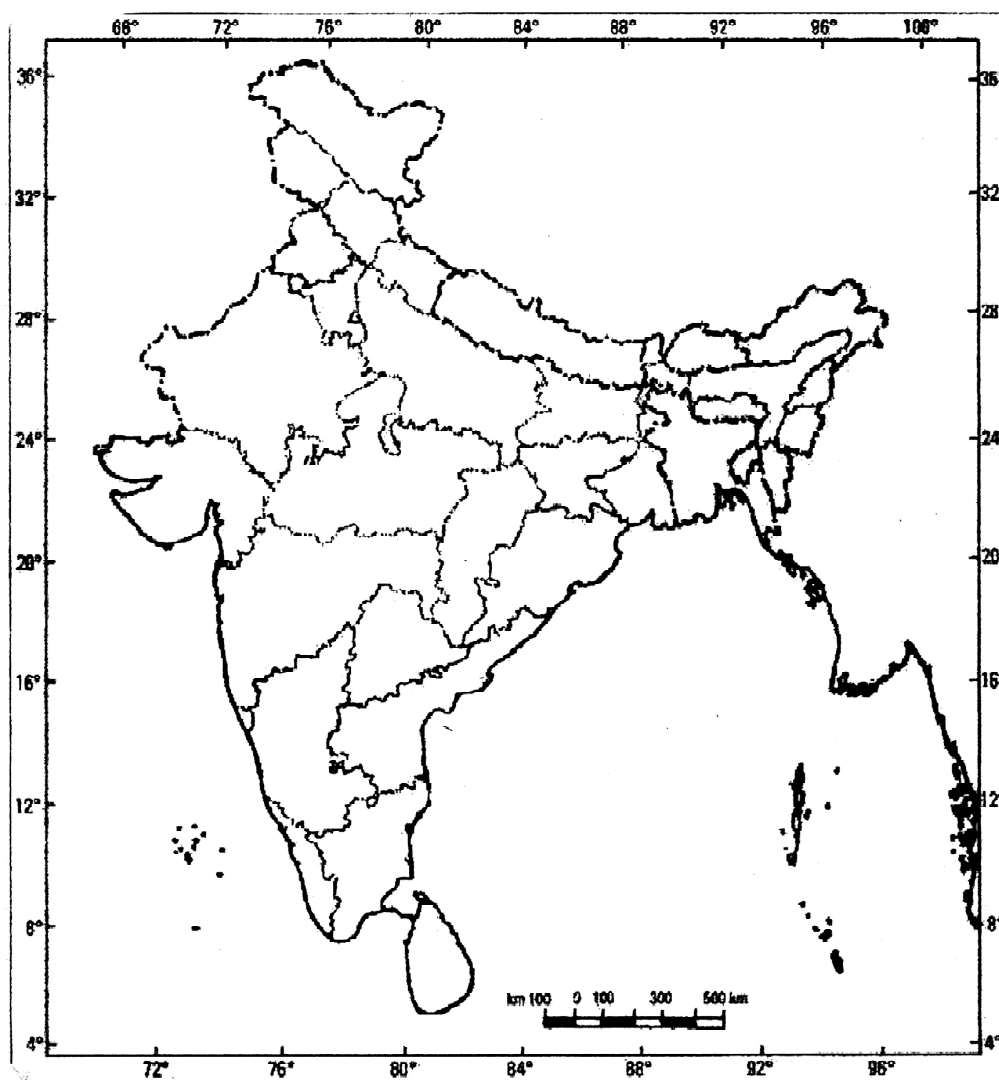
Q.4. What type of knowledge can be used in development of forest?

- (a) age old knowledge
- (b) technological knowledge
- (c) educational
- (d) participation in conservation

Ans. (a)

Map work show in the political outline map of India.

- (i) Nanda Devi
- (ii) Sunderban
- (iii) Bay of Mannar
- (iv) Nilgiris
- (v) Panch marhi
- (vi) Simllipal
- (vii) Achanakmar-Amarkantak



Chapter - 7

Natural, Hazards and Disasters

- Disaster is an undesirable occurrence resulting from forces that are largely outside human control.
- Disaster strikes quickly with little or no warning.
- They are causes or threaten serious disruption of life and property including death and injury to a large number of people.
- Nature influences humans in all respects, it provides both moments of happiness and sadness.
- Change is the law of nature, it is a continuous process that goes on uninterruptedly involving phenomena, big and small, material and non-material that make our physical and socio-cultural environment.
- Change can be a gradual or slow process like the evolution of land forms and organisms, it can be as sudden and shift as volcanic eruptions, tsunamis, earthquakes and lightning etc.
- Disasters in general and natural disasters in particular are some changes that are disliked and feared by humankind.
- Man has been bearing the burden of natural disasters since ancient times. There are many disasters which man is unable to face, prevent from happening. He stands just as a mute witness or be a target of many negative effects of natural disasters.
- Natural forces are not the only causes of disasters, disasters are caused by some human activities. Some activities are carried by human beings that are directly responsible for disasters.

- Natural hazards are elements of circumstances in the natural environment that have the potential to cause harm to people a property or both
- These may be swift or permanent aspects of the respective. Environmental settings like currents in the ocean, steep slope and unstable structural features in the Himalayas or extreme climatic conditions in deserts or glaciated areas.
- No possibility is there to prevent natural disasters. So the best way out is to emphasise on natural disaster mitigation and management.
- National institute of disaster management has been established in India.
- Natural disasters in India—Earthquake, Tsunami, Floods, Droughts and land slides.

MCQ, Objective And Fill In The Blanks, Type Question And Answers

Q.1. Which one of the following is not associated to human activities?

- (a) Chernobyl nuclear disaster
- (b) Tsunami
- (c) Bhopal gas tragedy
- (d) Release of chloro fluorocarbons.

Ans. (b)

Q.2. Which of the following is not included in the categorized of natural disasters?

- (a) Earthquake
- (b) Atmospheric
- (c) Terrestrial
- (d) Aquatic

Ans. (a)

Q.3. Which of the following is the part of resolution of the world conference on natural disasters reduction yokohama 1994?

- (a) human and institutional capacity-building and strengthening
- (b) Technology sharing the collection the dissemination and utilisation of information, and
- (c) Mobilisation of resources
- (d) All of the above

Ans. (d)

Q.4. Which one is not a type of drought?

- (a) Meteorological droughts
- (b) Hydrological droughts
- (c) Agricultural droughts
- (d) Productivity droughts

Ans. (d)

Q.5. Which one is not included in water-borne diseases?

- (a) Cholera
- (b) Hepatitis
- (c) gastro-enterites
- (d) Malaria

Ans. (d)

Q.6. are by far the most unpredictable and highly destructive of all the natural disasters.

Ans. Earthquakes

Q.7. Scholars described India using two meaning ful adjectives, they are:

- (a) 'Indian subcontinent and the land of unity'
- (b) 'Indian subcontinent and the land of religions'
- (c) 'Indian subcontinent and the land of cultures'
- (d) 'Indian subcontinent and the land of rivers'

Ans. (a)

Q.8. Which one is the another name of Tsunami?

- (a) Primary waves
- (b) Seismic sea waves
- (c) surface waves
- (d) secondary waves

Ans. (b)

Q.9. Examine which of the following countries frequently observed 'The Tsunamis'?

- (a) Argentine, Brazil, Uruguay
- (b) India, Srilanka, Malaysia
- (c) Portugal, Spain, Italy
- (d) U.S.A., Canada, Maxico

Ans. (b)

Q.10. Tropical cyclones are characterised by

Ans. Large pressure gradients

Q.11. Which of the following authority identified flood prone areas in India?

- (a) Gas Authority of India
- (b) Geological survey of India
- (c) National flood commission
- (d) National water commission

Ans. (c)

Q.12. Western ghats, Himalayas and Nilgiris are examples of which of the following land slide zones?

- (a) High vulnerability zone
- (b) Moderate to low vulnerability zone
- (c) Very high vulnerability zone
- (d) Other areas

Ans. (c)

Q.13. Arrange the correct sequence of Column-II against the states in Column-I

Column-I	Column-II
(i) Yokohama	1. Earth summit-1993
(ii) Assam	2. Shallow water waves
(iii) Tsunami	3. World conference on natural disaster reduction
(iv) Rio-de-Janerio	4. Majuli
(a) i - 3, ii - 1, iv - 4, iii - 2	
(b) i - 3, ii - 4, iii - 2, iv - 1	
(c) iii - 1, iv - 4, ii - 3, i - 2	
(d) iv - 4, iii - 3, ii - 2, i - 1	

Ans. (b)

Q.14. Match Column-I with Column-II

1. Change is the law of nature	(a) human activities
2. Geographical literature viewed disasters as	(b) Possible to present
3. Some disasters are caused by	(c) a continuous process
4. Due to deforestation	(d) a consequences of natural forces
5. Disasters created by human actions	(e) Landslide and flood

Ans. 1 - c, 2 - d, 3 - a, 4 - e, 5 - b

Q.15. Assertion (A) Most of the areas that can be considered, safe are from the stable land mass covered under the deccan plateau.

Reason (R) Earthquake robs the population on the their material and socio-cultural gains that they have preserved over generations.

- (A) A and R, both are correct, R is correct explanation of A
- (B) Both, A and R are correct but 'R' is not correct explanation of A
- (C) Only 'A' is correct
- (D) Only 'R' is correct

Ans. (B) Both, A and R are correct but 'R' is not correct explanation of A

Q.16. Fill in the blanks

- (i) Sudden displacement of ocean water in the form of high vertical waves are called
- (ii) Earthquakes that are of origin.
- (iii) The plate is moving at a speed of one centimetre per year towards the north and north eastern direction.
- (iv) Tropical cyclones are intense areas
- (v) Coriolis force near the equator is marked
- (vi) The centre of the cyclone is mostly a warm and low pressure, cloudless cover known as
- (vii) Flash floods, pattern of monsoon and blocking of the most of the and river channels.

(viii) can also be an effective method in minimising the effect of

- Ans. (i) Tsunami (ii) Tectonic
(iii) Indian (iv) Low pressure
(v) Absence (vi) Eye of the storm
(vii) Streams (viii) Rainwater harvesting, draught

Q.17 Which of the following plate is moving at a speed of one centimetre per year towards the north and North eastern direction?

- (A) Indian Plate (B) Eurasian Plate
(C) Nazcaplate (D) Australian plate

Ans. (A) Indian Plate

Short answer type questions

Q.1. Differentiate between natural hazards and natural disasters.

- Ans. (a) Natural Hazards: Natural hazards are elements of circumstances in the natural environment that have the potential to cause harm to people or property or both. There may be shift or permanent aspects of the respective environmental settings like currents in the ocean, steep slope and unstable structural features in the Himalayas etc.
- (b) Natural disasters: Natural disasters are relatively sudden and cause large scale, wide spread death, loss of property and disturbance to social systems and life over which people have a little or no control.

So any event can be categorised as disaster when the magnitude of destruction and damage caused by it is very high.

Q.2. Classify natural disasters.

Ans. Identification and classification of disasters is being considered as an effective and scientific step to deal promptly and efficiently in the disasters

- (a) Atmospheric : Thunder storms, lightning, tornadoes, drought, hail storm, tropical storm etc.
- (b) Terrestrial : Earthquakes, volcanic eruptions, land slides, avalanches, soil erosion etc.
- (c) Aquatic : Floods, Tidal waves, Ocean currents, storm surge, tsunami.
- (d) Biological : Plants and animals, fungal, bacterial and viral diseases such as bird flue, dengue, covid-19, Ebola etc.

Q.3. Examine the causes and effects of Tsunami.

Ans. Causes:

- (i) Earthquakes and volcanic eruption
- (ii) Land slides

Effects:

- (i) The Tsunami waves release enormous energy stored in them and water flows turbulently on to the land destroying port, cities and towns, structures buildings and other settlements.
- (ii) As coastal areas are densely populated the world over and these are also centres of intense human activity, loss of life and property to be much higher by a Tsunami.

(iii) The extent of devastation caused by this can be examined through visuals on band Aceh (Indonesia) 2004, 26 Dec.

Q.4. Evaluate the three stages involved in disaster mitigation and management.

Ans. (i) Pre-disaster management involves generating data and information about the disasters, preparing vulnerability zoning maps and spreading awareness among the people about these. Disaster planning, preparedness and preventive measures are other steps to be taken in the effected areas.

(ii) During disaster rescue and relief operations like- evacuation, construction of shelters and relief camps supplying of water, food, clothing and medical aids.

(iii) Post-disaster operations should involve re-habilitation and recovery of victims. It should concentrate on capacity building in order to cope up with future disasters.

All these measures have unique importance to the nation like India, as a big part of its geographical area and equal proportion of its population vulnerable to disasters.

Q.5. Highlight the type of droughts.

Ans. (i) Meteorological droughts: This situation arises when a prolonged period of inadequate rainfall marked with mal-distribution of same over time and space.

(ii) Agricultural drought: It is characterised by low-soil moisture that is necessary to support the crops, resulting, a crop failures. If an area has more than 30 percent of its gross cropped area under irrigation, the area is excluded from the drought prone area or category.

- (iii) Hydrological draught : It occurs when the availability of water in different sources- storages and reservations falls below which the precipitation can replenish.
- (iv) Ecological draught : Whenever the productivity of a natural ecosystem fails due to shortage of water and as a consequence of ecological distress, damages are induced in the ecosystem.

Q.6. "Technological power has given large capacity to human intervention in nature", consequently increased their vulnerability to disasters. Explain the statement.

- Ans. (i) Human beings tend to intensify their activities into disaster prone areas.
- (ii) Increased vulnerability to disaster.
- (iii) Colonisation of flood plains of most of the rivers and development of large cities and towns make them vulnerable to the occurrence of cyclones, hurricanes and Tsunamis.

Q.7. Highlight the socio-environmental consequences of earthquakes.

- Ans. (i) It spreads disasters on the surface of the earth without discrimination.
- (ii) It becomes a calamity where it strikes the areas of high density of population.
- (iii) It not only damages and destroys the settlements infrastructure, transport and communication network, industries and other developmental activities.
- (iv) It also robs the population of their material and socio-cultural gains that they have preserved over generations.

Long answer type questions

Q.1. Identify the land slide prone regions of India and develop some measures to mitigate the disasters caused by these.

Ans. On the basis of past experiences; frequency and certain causal relationship with controlling factors like geology, geomorphic agents, slope, landuse vegetation cover and human activities, India is divided into a number of zones.

Landslide Vulnerability Zones

(i) Very high vulnerability zone: Highly unstable, young mountainous areas in the Himalayas and Andaman and Nicobar, high rainfall regions with steep slopes in the western ghats and Nilgiris, the north-eastern regions along with areas that experience frequent, ground-shaking due to earthquakes etc.

Areas of regular human activities, especially those related to construction of roads, dams etc are under this zone.

(ii) High vulnerability zone: It has the similar conditions to those included in the very high vulnerability zone. There is one difference, intensity and frequency of the controlling factors.

In this areas all Himalayan states, states from the north eastern regions are included.

(iii) Moderate to low vulnerability zone: This zone receives less precipitation- Ladakh and Spiti, undulated yet stable relief and low precipitation areas in the western and eastern ghats and Deccan plateau observe occasional landslides.

In Jharkhand, Odisha, Chhatisgarh, M.P. Maharashtra, Andhra Pradesh, Karnataka, Tamil nadu, Goa and Kerala land slides are most common due to mining.

- (iv) Other areas : States like- rajasthan, haryana, uttar pradesh, bihar, west bengal, coastal areas of southern states are safe from the land slides.

Measures :

- (i) Afforestation: Planting of trees and bushes is one sure way of stopping land slides as vegetation helps to bind the soil.
- (ii) New techniques in road construction: At the time of construction of roads, there should be less debris removal road should be constructed in manner which have great strength and are permanently concrete to last for long period of time.
- (iii) Mining of mineral and quarrying of stones in Himalayan region should be banned.
- (iv) Deforestation should be stopped.
- (v) Permanent types of fruit trees should be planted in mountainous areas.
- (vi) To promote contour agriculture at slopes.

Q.2. Why flood occurs in India? Mention the flood prone areas and flood control measures in India.

Ans. Floods are slow in occurrences and occur in well recognised regions and with in expected time in a year.

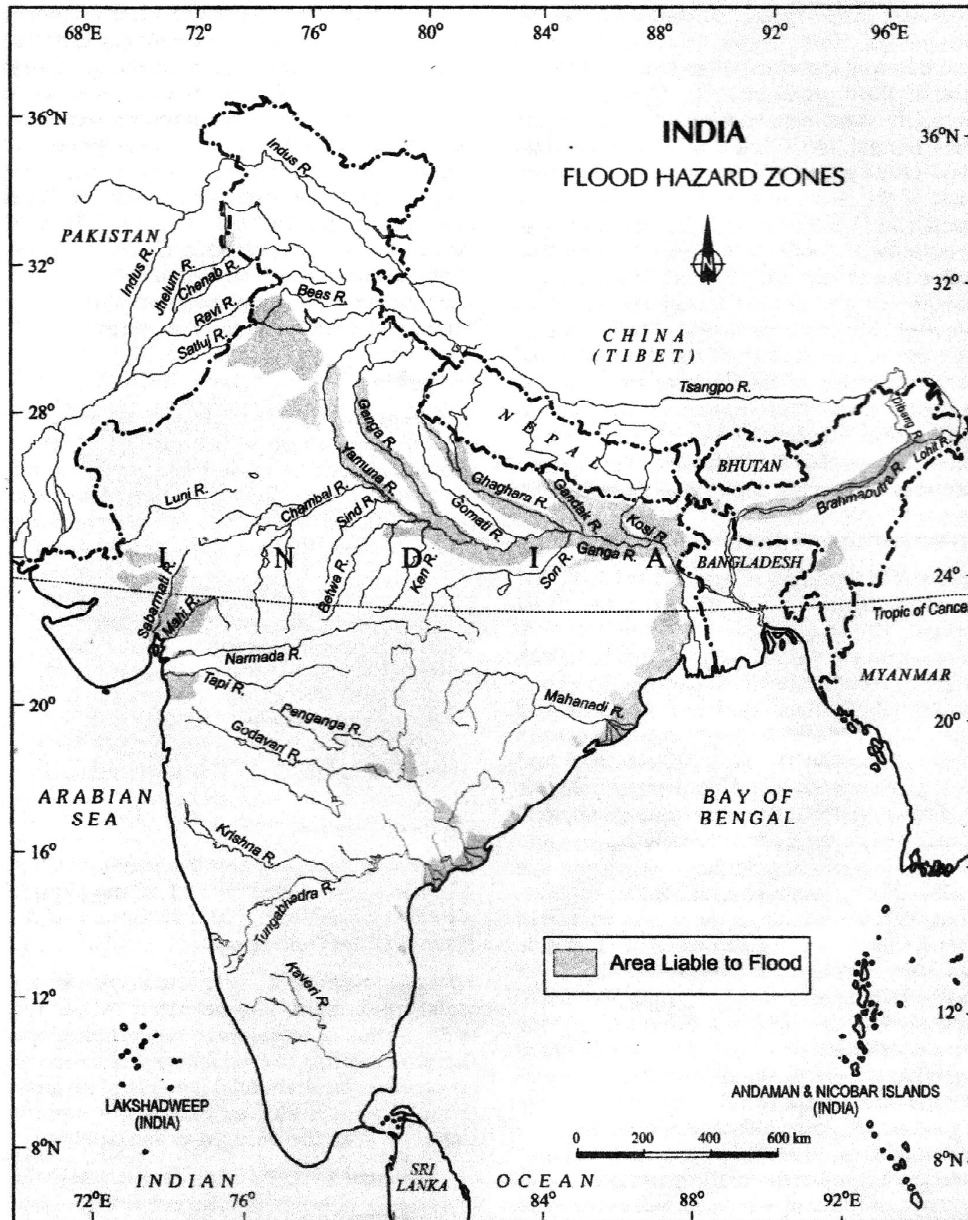
Floods occur usually when water in the form of surface run off exceeds the carrying capacity of the river channels and streams flow into the near by low lying flood plains.

Floods prone areas : At one time, Uttar Pradesh, Bihar, West Bengal, Assam and Odisha were recognised flood prone areas for the last few years, Andhra Pradesh, Haryana, Punjab, Gujarat as well as some dry areas of Rajasthan are included among flood prone areas.

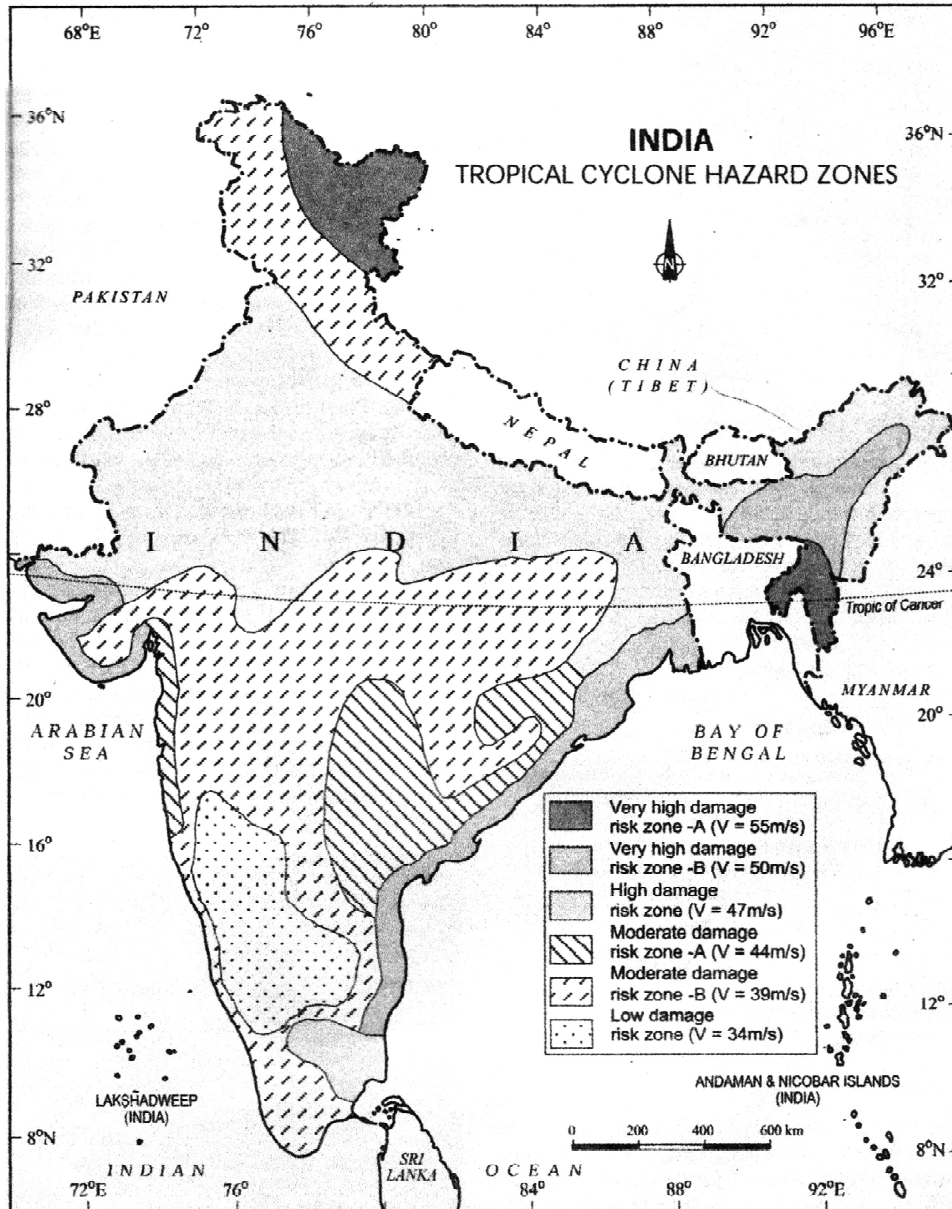
In Rajasthan, there is another problem, no natural drainage to take over water during heavy rainfall.

Flood control measures:

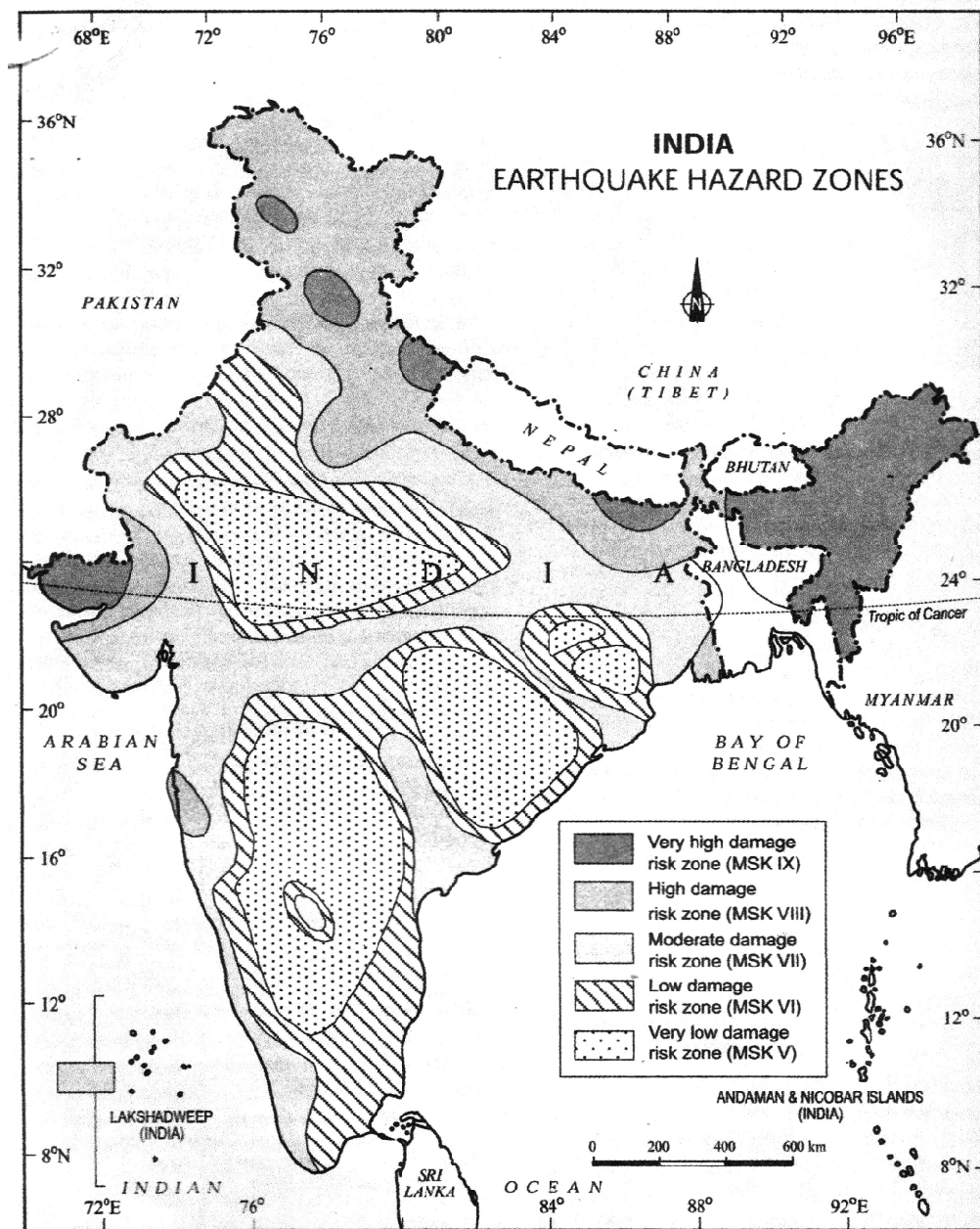
- (i) Reservoirs : Construction of reservoirs in the direction of flooding of rivers can help in the storage of excess water of rivers.



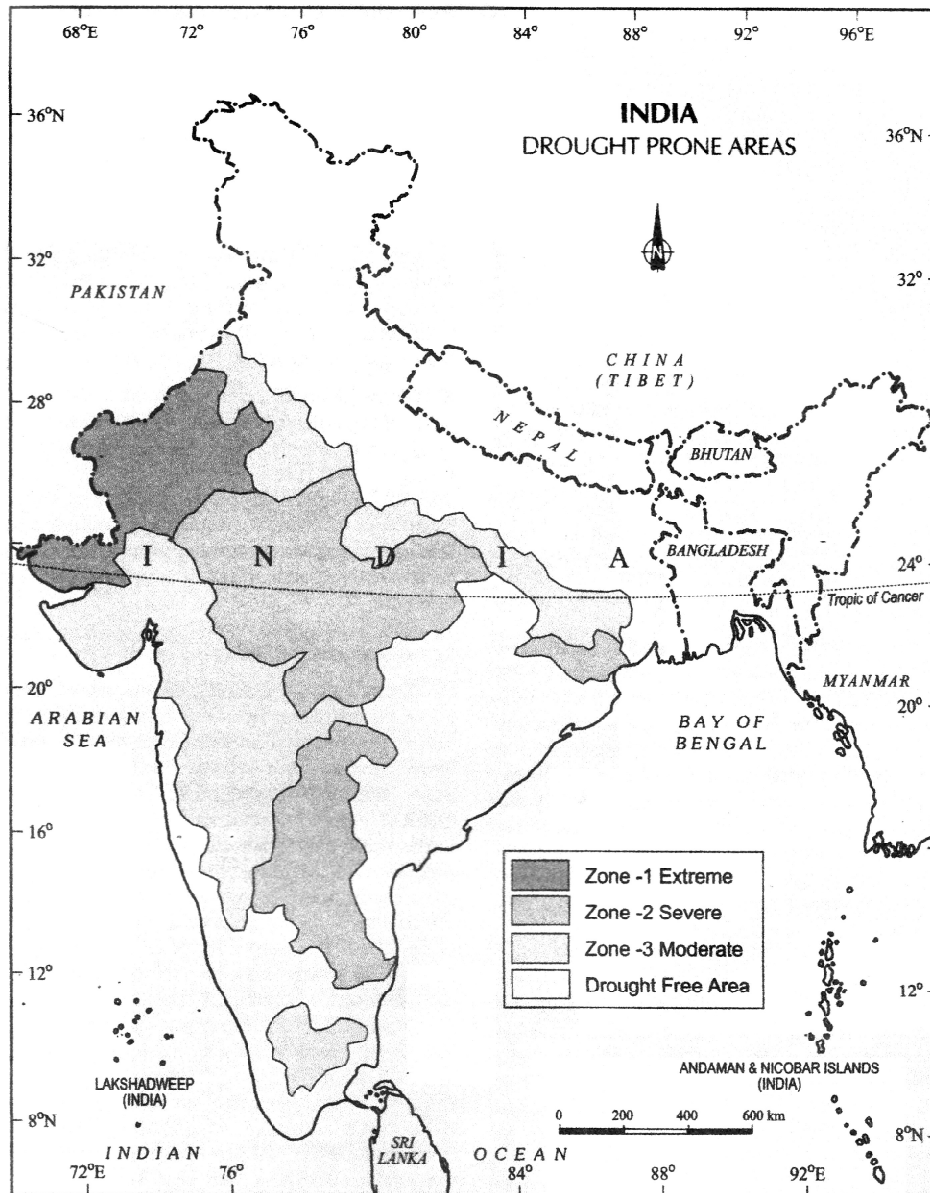
- (ii) Embankment : Flood protection embankments on the bank of rivers or streams prone to flooding can help prevent flooding. Flood embankments along river Yamuna in Delhi has proved very effective.



- (iii) Planting of trees : In river basins can help prevent flood. Through reduction in the speed of surface flow of water as well as letting some water deep underground.



- (iv) Removal of human encroachment from the river channels and depopulating the flood plains.



- (v) Re-establishment of natural drainage system: The interference

created in natural flow of water through construction of roads, railways, canals can be minimised by allowing the water flow along the natural centre to reduce impact of floods.

- (vi) To setup advance information system in respect of cyclones etc in all prone areas.

Q.3. What is drought? Mention drought prone areas and highlight steps to reduce the impact of drought.

Ans. Scarcity of rainfall over a large area and over a long period of time can be termed as drought to describe drought terms like scarcity of rainfall or dryness are also used.

Drought Prone Areas

- Main drought prone belt passes through Gujarat, Rajasthan and central India.

It extends upto peninsular India. Some districts of Odisha, Chhatisgarh, Uttar Pradesh, Jharkhand, West Bengal are also drought prone. In addition there are two districts each in Himachal Pradesh, and Laddakh are known as cold desert.

Steps to reduce the impact of drought

- (i) Dry Farming: In the areas of dry climate cultivation of coarse grains can be undertaken through ploughing the fields much deeper. Check dams and other rain water harvesting schemes to augment ground water can be undertaken.
- (ii) Dry crop cultivation: New hybrid varieties of seeds like those of cotton, moong, fodder, bajra and wheat could be sown which can with stand dry condition. It can help mitigate the sufferings on account of drought.

- (iii) Water harvesting: Every drop of rainwater can be harvested to overcome drought conditions.
- (iv) In some specific areas with precipitous slopes terrace farming and planting of trees at the periphery of the fields can be undertaken to take maximum advantages of water resources. Irrigation canals can be lined and paved to prevent water loss.

Q.4. What is an earthquake? Examine their causes and effects.

Ans. These earthquakes result from a series of earth movements brought about by a sudden release of energy during the tectonic activities in the earth crust.

A sudden trembling in the earth's crust or the mantle produced by the vibratory waves or shock emanating from a certain point is called an earthquake.

Causes:

- (i) Major causes of earthquakes are tectonic disturbances in the interior of the earth or volcanic eruption.
- (ii) Falling of roofs of rock-caves in the interior of the earth causing, displacement of rocks also produce minor tremors. In India, tectonic disturbances are the main cause of earthquakes.

Effects :

- (i) Loss of property : during the earthquake everything from a small cottage to a palace or from a single storeyed house to a high-rise building everything may be reduced to rubble. the pipe lines under the ground and railway lines on the surface both may break into pieces.

Dams across the rivers may collapse and the floods that may be caused more dangerous and destructives.

- (ii) Loss of life: The earthquake shocks which last just few seconds take the life of thousands of people and animals.
- (iii) Change in the course of rivers: The intensity of the earthquake may bring change in the slope and landscape with may in turn cause changes in the course of rivers. It can be a cause of floods, which poses a danger to life and property.
- (iv) Tsunami : High waves in the sea which are known as tsunami are caused by the earthquake. These tsunamis wash away human houses on the sea coasts.
- (v) Surface seismic waves produce fissure on the upper layers of the earths crust through which water and other volatile materials gushout, inundating the neighbouring areas.
- (vi) Earthquakes are also responsible landslides and these cause the obstacles in the flow of rivers and channels resulting in the forming of reservering.

Q.5. It is not possible to prevent the occurrence of an earthquake, best option is to emphasis on disaster preparedness and mitigation rather than curative measures. Analyse the statement.

OR

Analyse the earthquake hazard mitigation

- Ans. (i) Establishing earthquake monitoring centres for regular monitoring and fast dissemination of information among the people in the vulnerable areas.

- (ii) Use of GPS can be great help in monitoring the movement of tectonic plates.
- (iii) Preparing a vulnerability map of the country and dissemination of vulnerability risk information among the people and educating them about the ways of means minimising the adverse impacts of disasters.
- (iv) Modifying the house types and building designs in the vulnerable areas and discouraging construction of high rise buildings, large industrial establishments and big urban centres in such areas.
- (v) To make it compulsory to adopt earthquake resistant designs and use light materials in major construction activities in the prone areas.

Q.6. What is cyclonic disaster? Examine its destructive effects.

Ans. A cyclone is a ring shaped storm centre of very low pressure in which stormy winds blow with terrible speed and cause torrential rainfall. Which records between 50-100 cm.

Destructive effects:

- (i) The cyclones cause great damage through the entire path of its passage. The strong winds that precede and follow the cyclone blow away houses ranging from small huts to concrete structure and houses made of steel and stones.
- (ii) Trees, electric poles etc come in their way are uprooted and smashed.
- (iii) The heavy and torrential rains then cause the floods which play

further havoc all round. The strong winds generate storm surges in the sea which strike the coastal areas like a huge wall of water and cause damage.

- (iv) It plays havoc with roads fields houses factories electric poles and human settlements on the coasts.

Q.7. Examine the initial conditions for the emergence of a tropical cyclone.

Ans. (i) Large and continuous supply of warm and moist air that can release enormous latent heat.

- (ii) Strong coriolis force that can prevent filling of low pressure at the centre.

Absence of coriolis force near the equator prohibits the formations of tropical cyclone between 0° - 5° latitude.

- (iii) Unstable condition through the troposphere that creates local disturbances around which a cyclone develops.

- (iv) Ultimately absence of strong vertical wind wedge, which disturbs the vertical transport of latent heat.

Q.8. 'Floods have serious consequences on the national economy and society'. Analyse the statement.

Ans. (i) Due to frequent inundation of agricultural land and human settlement in many states flash floods have very serious consequences on national economy and society.

- (ii) Floods do not only move important crops every year but these also damage physical infrastructure roads, railway bridges and human settlements.

- (iii) Millions of people are rendered home less.

- (iv) They washed down along with their cattle.
- (v) Cholera, gastro enteritis hepatitis and other water borne diseases spread in the flood affected areas.

Case Study

Inundation of land and human settlements by the rise of water in the channels and its spill over presents the condition of flooding. Unlike other natural disasters, the causes of floods are well established. Floods are relatively slow in occurrences and often, occur in well identified regions and within expected time in a year. Floods occur commonly when water in the form of surface run off exceeds the carrying capacity of the river channels and streams and floods in to the neighbouring low-lying flood plains. At times, this even goes beyond the capacity of lakes and other inland water bodies in which they flow.

Q. (i) At which place river water flows?

Ans. Inundation of land and human settlements.

Q.(ii) Where does water go beyond the capacity?

Ans. Lakes and other inland water bodies.

Q.(iii) When do the floods occurs?

Ans. When water in the form of surface run-off exceeds the carrying capacity of the river channels and streams.

Source based Question

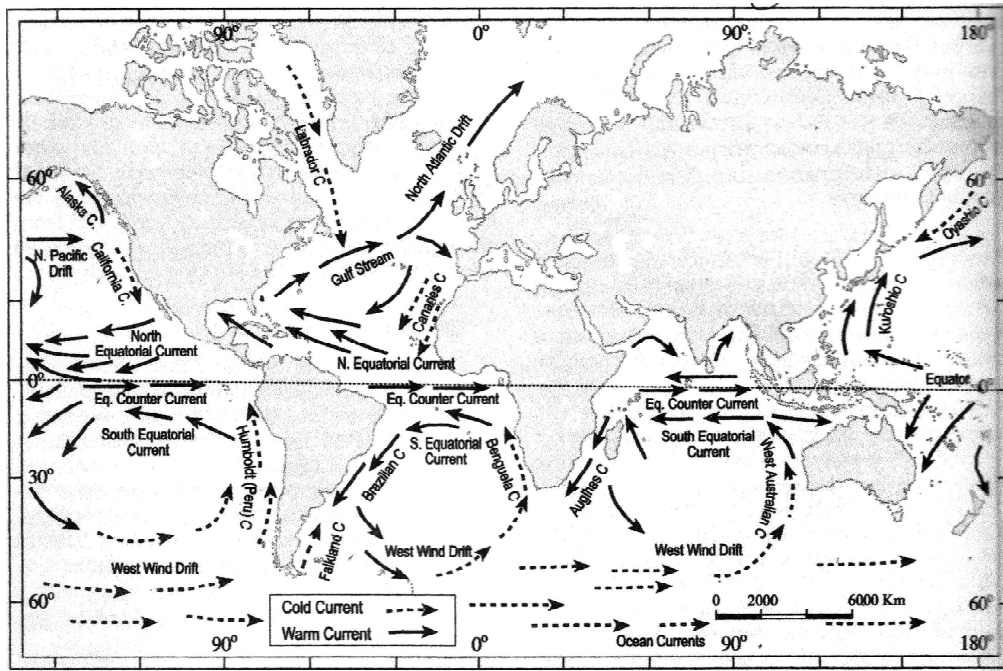
Read the plan of action given below and answer the questions that follow:

- (iii) What was accepted in this conference about the developing countries in the context of disasters?
- (a) Affected the rich and poor both
 - (b) Affected the poor and disadvantaged groups worst
 - (c) Affected the villagers and advantageous groups worst
 - (d) Affected the urban and disadvantageous groups worst

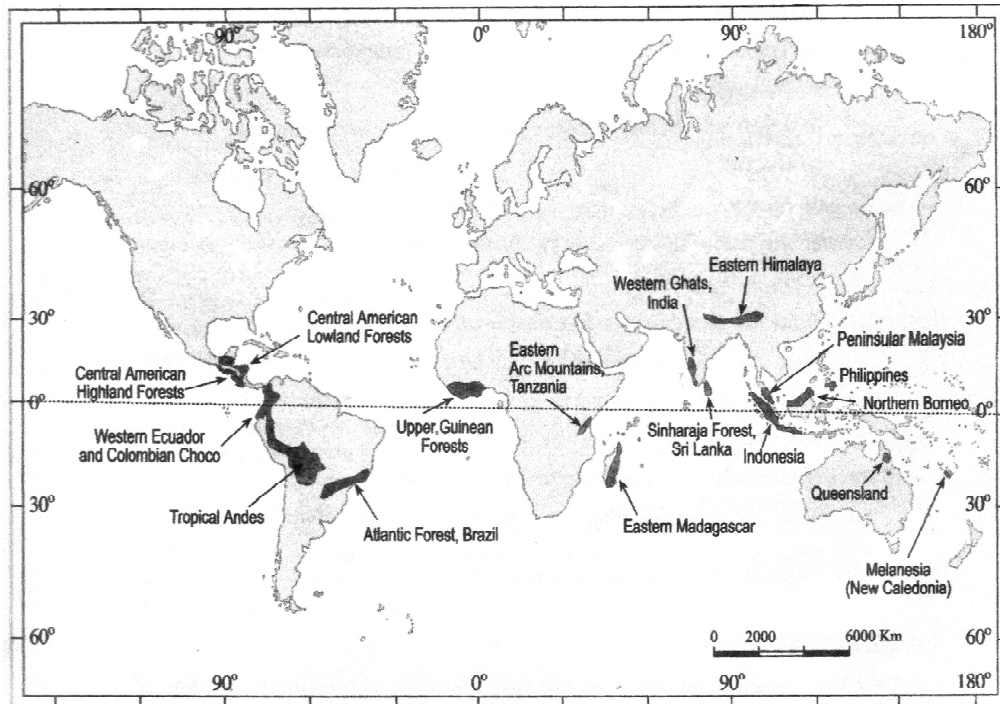
Ans. (b)

- (iv) What status of developing countries is mentioned in this source?
- (a) Ill Equipped to cope with them
 - (b) Semi Skilled to cope with them
 - (c) Untrained to cope with them
 - (d) Well prepared to cope with them

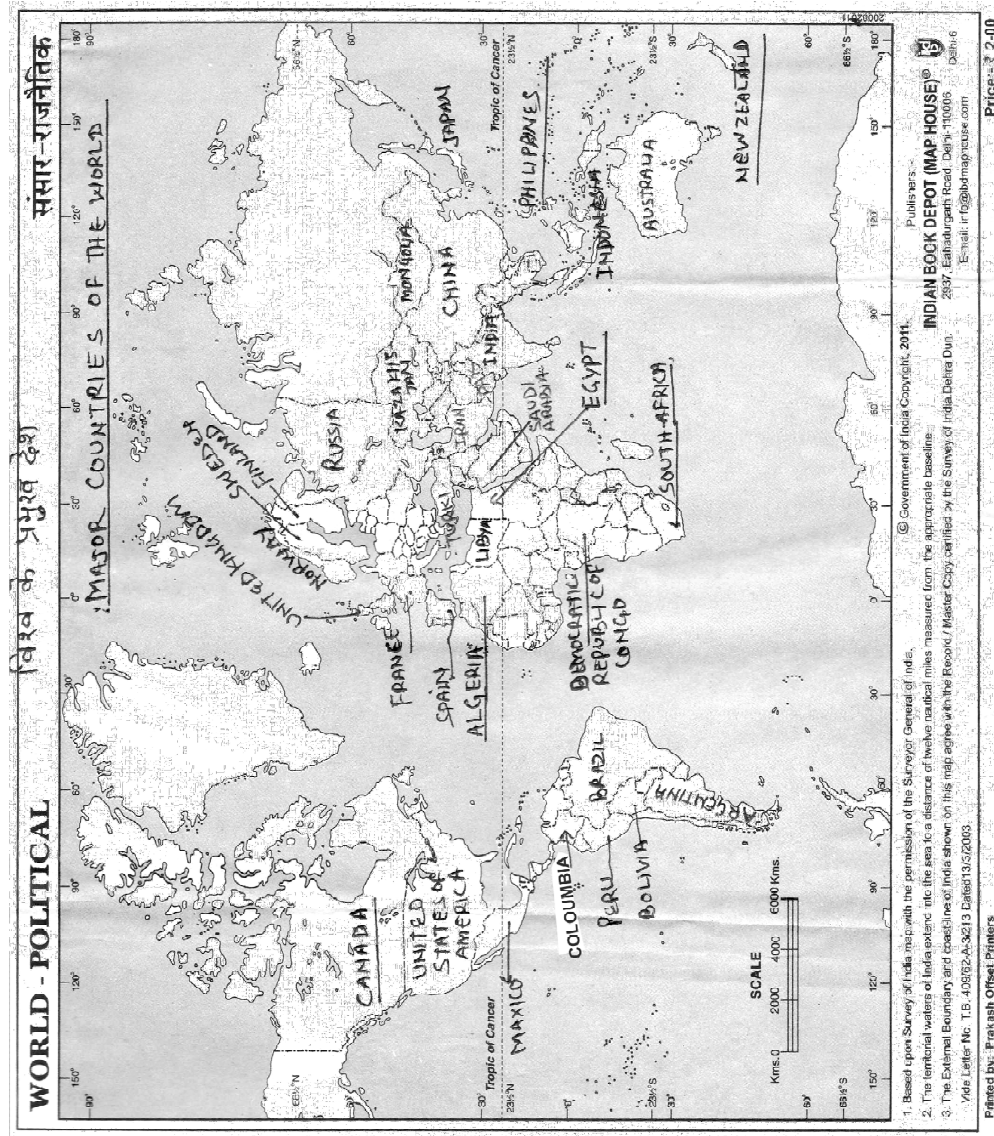
Ans. (a)



Major currents in the Pacific, Atlantic and Indian Oceans



Ecological 'hotspots' in the World



WORLD - POLITICAL Desert - HOT / COLD **दुर्ग व कूल भूभाग पर संसार-राजनैतिक**



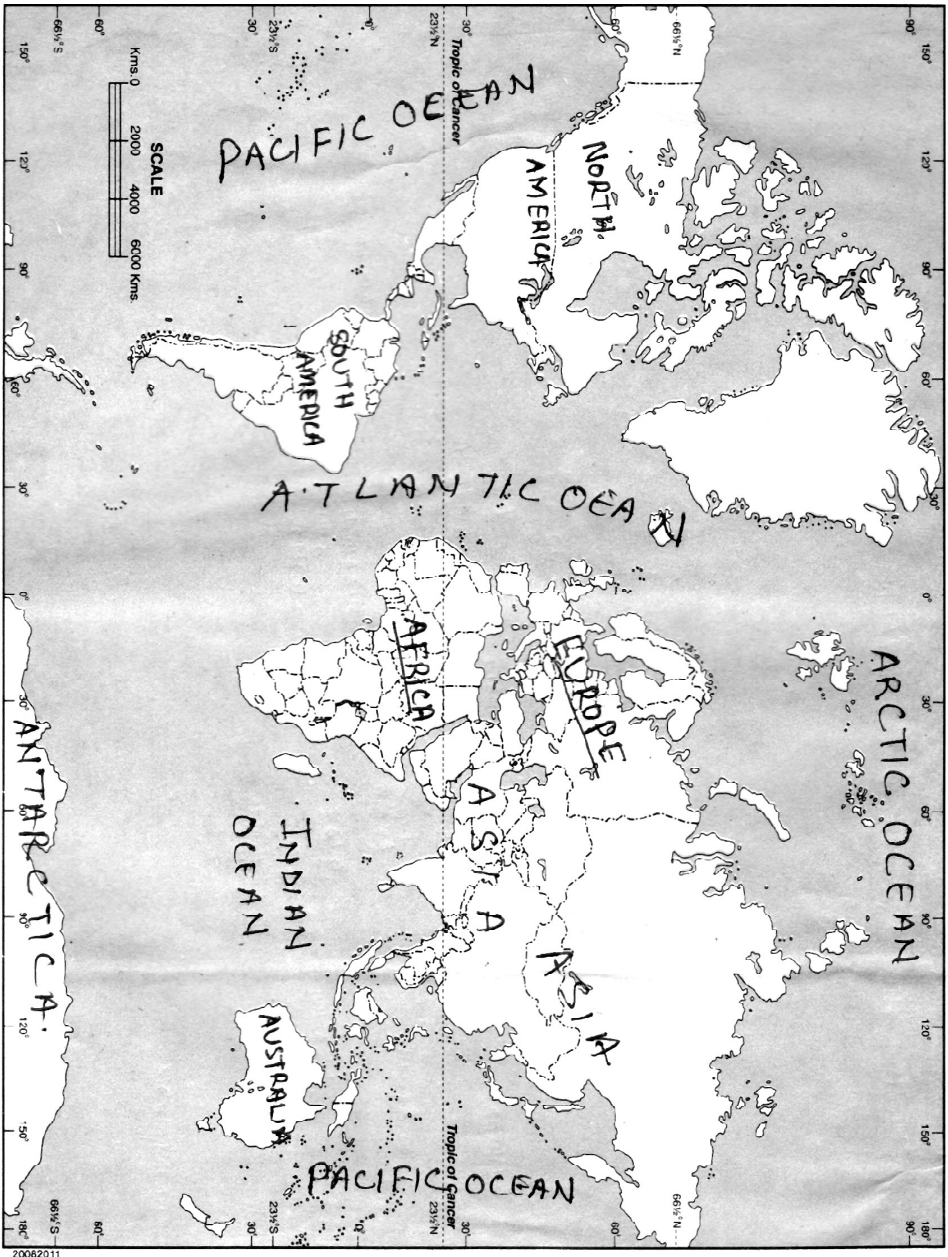
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WORLD - POLITICAL CONTINENTS AND OCEAN

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WORLD - POLITICAL MAPS PLATEAUS AND GRASS LANDS

संसार - राजनीतिक



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