

NEXT IAS

PHYSICAL & WORLD GEOGRAPHY

**CIVIL SERVICES
EXAMINATION 2026**

Published by





MADE EASY Publications Pvt. Ltd.

Corporate Office: 44-A/4, Kalu Sarai
(Near Hauz Khas Metro Station), New Delhi-110016
Contact: 011-45124660, 8860378007
E-mail: infomep@madeeasy.in
Visit us at: www.madeeasypublications.org

Physical & World Geography

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First Edition: 2017
Second Edition: 2018
Third Edition: 2019
Revised & Updated: 2020
Fourth Edition: 2021
Fifth Edition: 2022
Sixth Edition: 2023
Seventh Edition: 2023

Eighth Edition: 2024

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Physical & World Geography

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Unit

I

GEOGRAPHY AS A DISCIPLINE

1. Basics of Geography2

CHAPTER 1

BASICS OF GEOGRAPHY

Fundamentals of Geography

Introduction

The word 'Geography' has been derived from the *Greek Geo (Earth) and Graphos (description)*. It was coined by the Greek scholar 'Eratosthenes', also known as '*Father of Geography*'.

Geography is a science that deals with the description, distribution, and interaction of the diverse physical, biological, and cultural features of the Earth's surface.

Geography in Relation to Other Disciplines

Geographers do not study only the variations in the phenomena over the Earth's surface (space) but also study the associations with the other factors which cause these variations.

For example, cropping patterns differ from region to region but this variation in cropping pattern, as a phenomenon, is related to variations in soils, climates, demands in the market, capacity of the farmer to invest and technological inputs available to her/him.

Branches of Geography

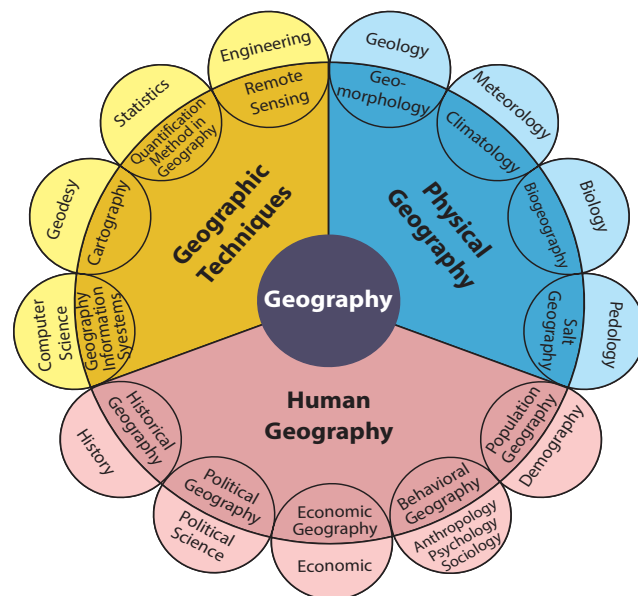


Fig. 1.1: Branches of Geography

• Physical Geography

1. **Geomorphology** is the study of landforms, their evolution and related processes.

2. **Climatology** is the study of structure of atmosphere and elements of weather and climates and climatic types and regions.
3. **Hydrology** 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.
4. **Soil Geography** aims to study the processes of soil formation, soil types, their fertility status, distribution and use.

• Human Geography

1. **Social/Cultural Geography** is the study of society and its spatial dynamics as well as the cultural elements contributed by the society.
2. **Population and Settlement Geography** studies population growth, distribution, density, sex ratio, migration and occupational structure etc. Settlement geography studies the characteristics of rural and urban settlements.
3. **Economic Geography** studies economic activities of the people including agriculture, industry, tourism, trade, and transport, infrastructure and services, etc.
4. **Historical Geography** studies the historical processes through which the space gets organised. Every region has undergone some historical experiences before attaining the present-day status. The geographical features also experience temporal changes and these forms the concerns of historical geography.
5. **Political Geography** looks at the space from the angle of political events and studies boundaries, space relations between neighbouring political units, delimitation of constituencies, election scenario and develops theoretical framework to understand the political behaviour of the population.

• Biogeography

The interaction between physical geography and human geography has led to the development of Biogeography which includes:

1. **Plant Geography** studies the spatial pattern of natural vegetation in their habitats.
2. **Zoo Geography** studies the spatial patterns and geographic characteristics of animals and their habitats.

3. **Ecology/Ecosystem** deals with the scientific study of the habitats characteristic of species.
4. **Environmental Geography** is concerned with environmental problems such as land gradation, pollution and concerns for conservation has resulted in the introduction of this new branch in geography.

The Latitudes and Longitudes

Earth is not spherical but “*oblate spheroid*” and objects of such shape (Earth like) are also termed as ‘*Geoid*’.

When we observe the cross section of the globe we can see that the cut around the equator is circular and the pole to pole cross section shows that it is elliptical in shape rather like a circle. Hence, we can say that the shape of the Earth is geoid.

The rotation of Earth on its rotational axis creates a bulge at the centre that is near equator, this rotation of Earth gives a geoid shape to Earth. Because of this rotation the polar regions are slightly flattened with a difference of around 0.3% compared to the equator. Thus we can say that our globe is oblate spheroid rather than a sphere.

Earth's rotation axis is an imaginary line that connects the points on Earth's surface from north pole to South pole. Perpendicular to the rotational axis of Earth we can find the plane of Equator.

Latitudes

All parallel circles from the equator up to the poles are called parallels of latitudes. Latitudes are measured in degrees.

The equator represents the zero degree latitude. Since the distance from the equator to either of the poles is one-fourth of a circle round the Earth, it will measure $\frac{1}{4}^{\text{th}}$ of 360 degrees, i.e., 90°. Thus, 90 degrees north

latitude marks the North Pole and 90 degrees south latitude marks the South Pole. As such, all parallels north of the equator are called ‘north latitudes.’ Similarly all parallels south of the equator are called ‘south latitudes.’

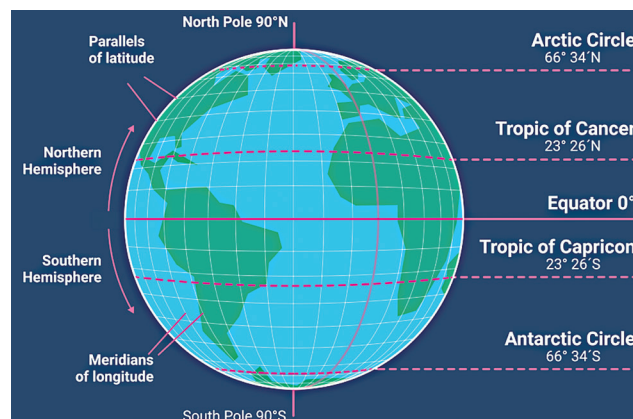


Fig. 1.2: Important Latitudes

Significant Latitudes	
0°	Equator
23.5° N	Tropic of cancer
23.5° S	Tropic of Capricorn
66.5° N	Arctic circle
66.5° S	Antarctic circle
Latitudinal Distribution	
Low latitudes	Between equator and 30° N/S
Mid latitudes	Between 30° and 60° N/S
High latitudes	Latitudes greater than 60° N/S
Equatorial	Within a few degrees of the equator
Tropical	Within the tropics 23.5° N to 23.5° S
Sub-tropical	Pole-ward of tropics 25-30° N/S
Polar	Within a few degrees of N/S pole



Fig. 1.3: Tropic of Cancer passes by few important Indian cities

Important cities on/near Tropic of Cancer in India:

Ahmedabad, Jasdan in **Gujarat**; Kalinjarh, Banswara in **Rajasthan**; Ujjain, Bhopal, Jabalpur, Shahdol, Shajapur in **Madhya Pradesh**; Ambikapur, Sonhat in **Chhattisgarh**; Ranchi, Lohardaga in **Jharkhand**; Hooghly, Krishnanagar in **West Bengal**; Udaipur in **Tripura**; Champhai in **Mizoram**.

Countries Through Which Tropic of Cancer Passes	
Algeria	Niger
Libya	Egypt
Saudi Arabia	UAE (Abu Dhabi)
Oman	India
Bangladesh	Myanmar
China	Taiwan
Mexico	Bahamas
Western Sahara	Mauritania
Mali	

Important Water Bodies Through Which Tropic of Cancer Passes	
Red Sea,	Indian Ocean,
Taiwan Strait,	Pacific Ocean,
Philippine Sea,	Gulf of California,

Important Water Bodies Through Which Tropic of Cancer Passes	
Gulf of Mexico	Atlantic Ocean.

Countries Through Which Equator Passes	
Ecuador,	Colombia,
Brazil,	Sao Tome & Principe,
Gabon,	Republic of the Congo,
Uganda,	Kenya,
Somalia,	Maldives,
Indonesia	Kiribati.
Democratic Republic of the Congo,	
At least half of these countries rank among the poorest in the world.	

Countries Through Which Tropic of Capricorn Passes	
Argentina,	Australia,
Botswana,	Brazil,
Chile,	Madagascar,
Mozambique,	Namibia,
Paraguay.	

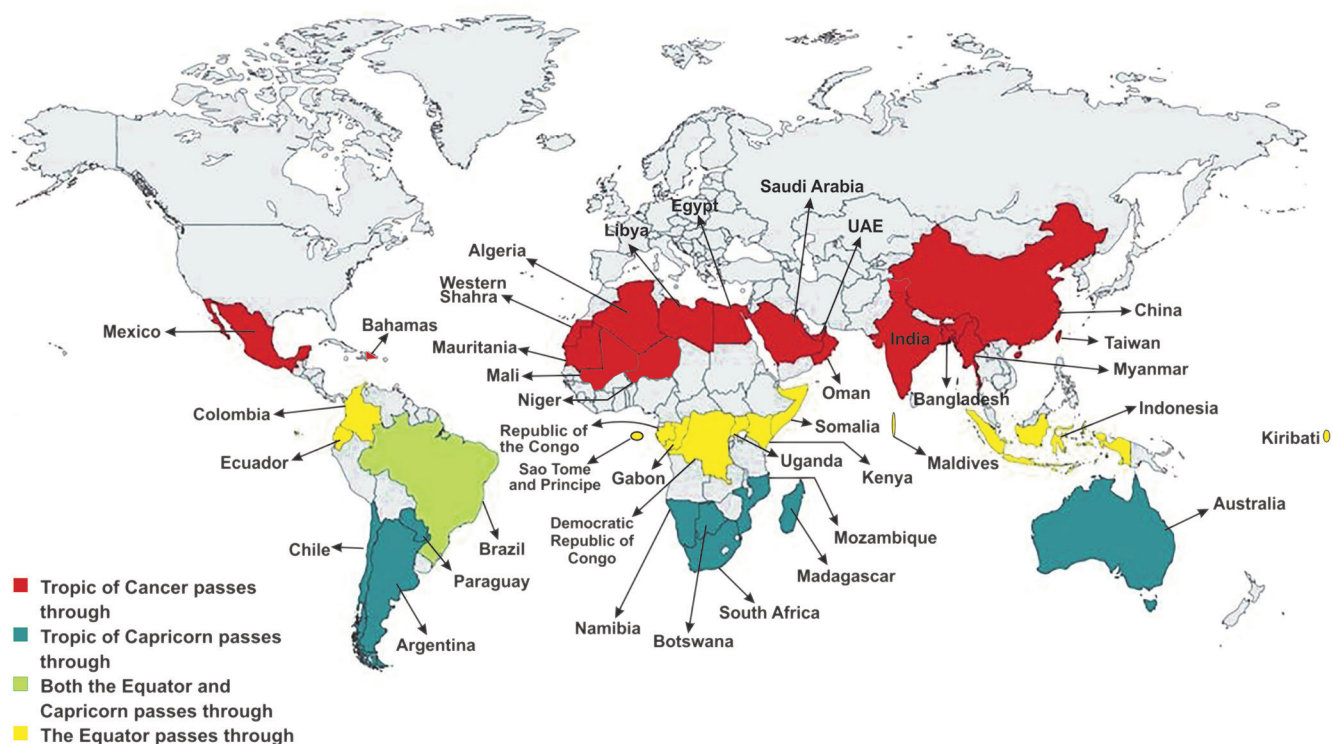


Fig. 1.4: Countries which pass through Equator, Tropics of Cancer and Capricorn

Longitudes

In order to locate a position precisely, we must find out how far east or west these places are from a given line of reference running from the North Pole to the South Pole. These lines of references are called the meridians of longitude, and the distances between them are measured in 'degrees of longitude.'

Each degree is further divided into minutes, and minutes into seconds. They are semi-circles and the distance between them decreases steadily pole wards until it becomes zero at the poles, where all the meridians meet.

Unlike parallels of latitude, all *meridians are of equal length*. The longitude which passes through Greenwich near London, where the British Royal Observatory is located is called the *Prime Meridian*.

Its value is 0° longitude and from it we count 180° eastward as well as 180° westward.

The Prime Meridian divides the Earth into two equal halves, the Eastern Hemisphere and the Western Hemisphere. Therefore, the longitude of a place is followed by the letter E for the east and W for the west.

It must be noted that *180° East and 180° West meridians are on the same line*.

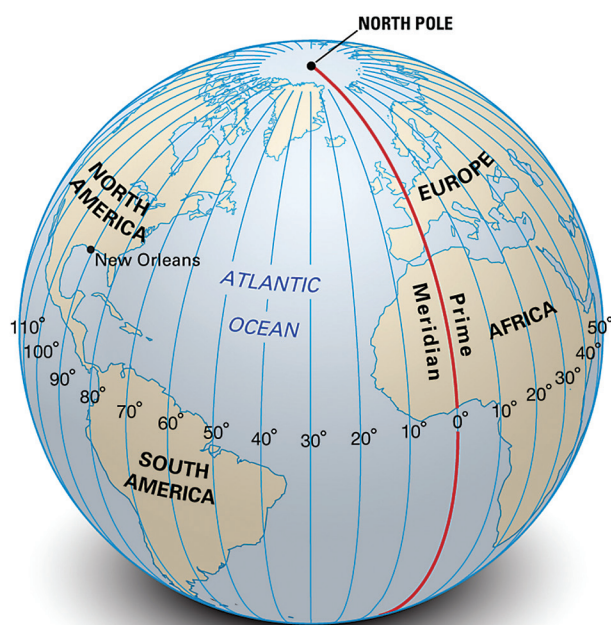


Fig. 1.5: Prime Meridian

Important cities of the world on/near prime meridian

The city which is closest to the prime meridian is London. The prime meridian runs through the Royal Observatory in the town of Greenwich, which is in southeast London. Other important cities which are located near the prime meridian are *Aberdeen, Paris, Algiers, Accra (Ghana)* etc.

Important Countries of the World on/near Prime Meridian

In the Northern Hemisphere, the Prime Meridian passes through the *UK, France and Spain in Europe and Algeria, Mali, Burkina Faso, Togo and Ghana in Africa*.

The only landmass crossed by the Meridian in the Southern Hemisphere is Antarctica.



Fig. 1.6: Important Countries of the World on/near Prime Meridian

Time Zones

- Time Zones are a geographical division of 15° each, starting at Greenwich, in England. It has been created to know local time of a place with respect to *Greenwich Mean Time (GMT)*.
- In order to make local time suitable and convenient different types of time such as the *Daylight Savings Time* and place specific time such as *Chai Bagan Time* has been developed.
- There are spatial variations in time zones across the world. Time Zones are usually defined by the country's government or some astronomical institute.
- **Council of Scientific & Industrial Research (CSIR) -National Physical Laboratory (CSIR-NPL)** is the custodian of Indian Standard Time (IST) and has the responsibility for realization, establishment, maintenance and dissemination of IST through an Act of Parliament.

Greenwich Mean Time

- Greenwich Mean Time is the yearly average (or 'mean') of the time each day when the Sun crosses the Prime Meridian at the Royal Observatory, Greenwich.

Indian Standard Time

- Indian Standard Time calculates on the basis of **82.5° E longitude**, just west of the town of Mirzapur, near Prayagraj (Allahabad) in the state of Uttar Pradesh.
- The longitude difference between Mirzapur and the United Kingdom's Royal Observatory at Greenwich translates to an exact time difference of 5 hours 30 minutes.

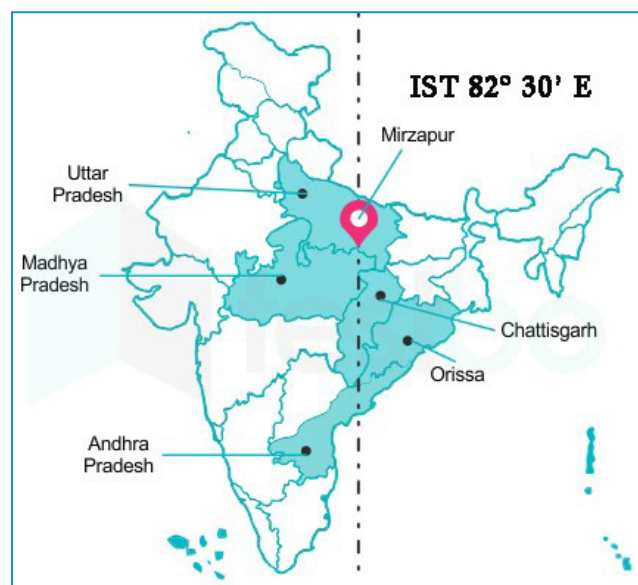


Fig. 1.7: Indian Standard Meridian

Cities and States Through Which 82.5° Longitude Passes

- Mirzapur and the Rampur, Korba and the Handi are major cities through which Indian Standard Meridian passes.
- It also passes through five states of Indian such as Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Odisha and Andhra Pradesh.

International Date Line

- The International Date Line, established in 1884, passes through the mid-Pacific Ocean and roughly follows a 180 degrees longitude north-south line on the Earth.
- It is located halfway round the world from the prime meridian—the zero degrees longitude established in Greenwich, England, in 1852.
- The International Date Line functions as a “line of demarcation” separating two consecutive calendar dates.
- For Example:** When you cross the dateline, you become a time traveler of sorts! Cross to the west and it's one day later; cross back and you've “gone back in time.”
- When you cross the International Date Line from west to east, you subtract a day, and if you cross the line from east to west, you add a day.
- The dateline is not defined by international law. Countries are free to choose the date and time zone that they want to observe.

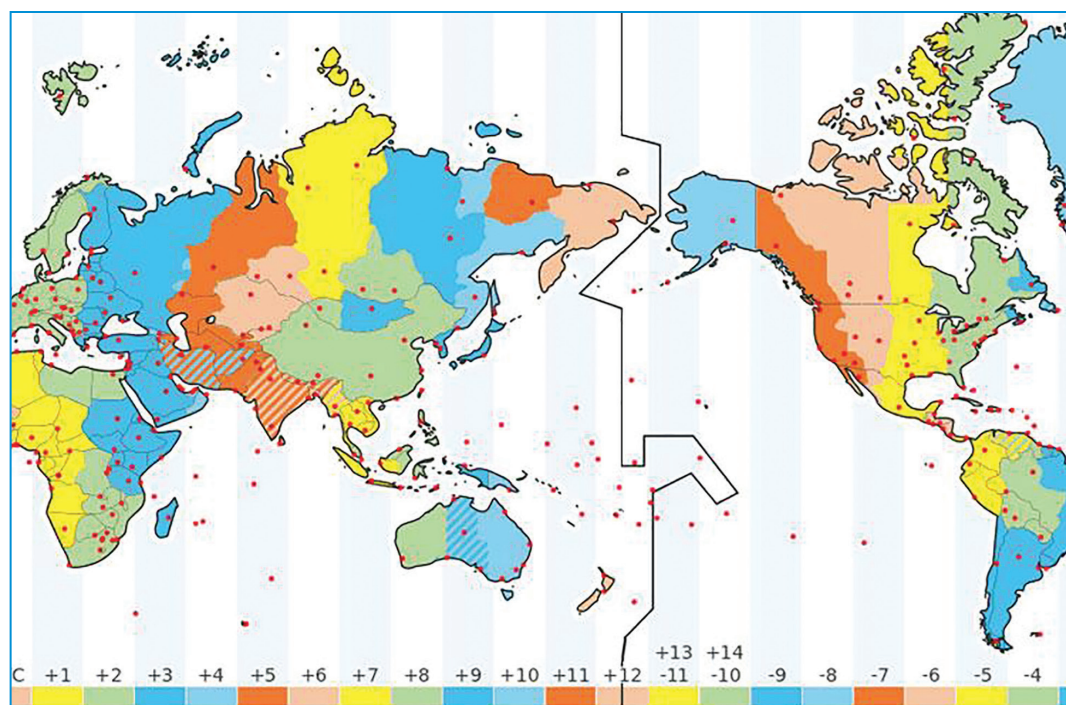


Fig. 1.8: The International Date Line (Different colours are indicating different time zones respectively)

While the date line generally runs north to south from pole to pole, it zigzags around political borders such as eastern Russia and Alaska's Aleutian Islands. It is done to ensure that it is the same date within a country.

Daylight Saving Time

- Daylight Saving Time is used to make the best use of daylight hours by shifting the clock forward in the Spring and backward in the Fall (autumn).
- It has been used throughout much of the United States, Canada and Europe since World War I.
- Regions that use Daylight Saving Time (DST) change the time zone name and time during the DST period.
- The words "daylight" or "summer" are then usually included in the time zone name. The areas that don't use DST remain on standard time zone all year.
- Proponents of DST generally argue that it saves energy, promotes outdoor leisure activity in the evening (in summer), and is therefore good for physical and psychological health, reduces traffic accidents, reduces crime and it promotes economic growth.

Chai Bagan Time

- A separate Chai Bagan Time zone is ahead of the Indian Standard Time by an hour and it was present in the British colonial era as well.
- Chai Bagan Time is essentially called *daylight saving* and north-eastern states have been demanding to

allow them to advance their clocks by some time (0.5-1 hour approx) to save more daylight hours.

- This time zone was **abolished in 1906** however, it was adopted during the Indo-China war of 1962 and the Indo-Pak war of 1965 and 1971
- For those living in north-eastern states, a change in time would mean a delayed sunset. This will allow the citizens to make use of added daylight hours.

Leap Second

Every now and then a leap second is added to Coordinated Universal Time (UTC) in order to synchronize clocks worldwide with the Earth's ever slowing rotation.

Two components are used to determine UTC (Coordinated Universal Time):

- **International Atomic Time:** A time scale that combines the output of some 200 highly precise atomic clocks worldwide, and provides the exact speed for our clocks to tick.
- **Universal Time:** It is also known as Astronomical Time, refers to the Earth's rotation around its own axis, which determines the length of a day.

When the difference between International atomic time and Universal time approaches 0.9 seconds, a leap second is added to UTC and to clocks worldwide.

By adding an additional second to the time count, our clocks are effectively stopped for that second to give Earth the opportunity to catch up.

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