Informative Ideas to Describe Some Aspect of Latitude & Longitude Which Involved in Geographic Coordinate System

Prof. Trupti Deoram Tembhekar, Prof. Trupti Jayant Sakhare
Assistant Professor
Department of Electrical Engineering
Yeshwantrao Chavan College of Engineering, Nagpur, (M.S.) India.

Abstract: - *India is one of the ancient civilizations in the world. It has achieved multi-faceted socio-economic progress during the last five decades. It has moved forward displaying remarkable progress in the field of agriculture, industry, technology and overall economic development. India has also contributed significantly to the making of world history. India is the seventh largest country of the world. India has a land boundary of about 15,200 km and the total length of the coastline of the mainland, including Andaman and Nicobar and Lakshadweep, is 7,516.6 km. The latitudinal extent influences the duration of day and night, as one move from south to north. India has 28 states and nine Union Territories.*

Keywords:-latitude, longitude, prime meridian, global position systems, topographic data, degree.

I. INTRODUCTION

Latitude and longitude is the most common grid system used for navigation. It will allow you to pinpoint your location with a high degree of accuracy. Latitude is the angular distance measured north and south of the Equator. The Equator is 0 degrees. As you go north of the equator the, latitude increases all the way up to 90 degrees at the North Pole. If you go south of the equator, the latitude increases all the way up to 90 degrees at the South Pole. In the northern hemisphere the latitude is always given in degrees north and in the southern hemisphere it is given in degrees south.

Longitude works the same way. It is angular distance measured east and west of the Prime Meridian (which has been arbitrarily set at Greenwich, England). The prime meridian is 0 degrees longitude. As you go east from the prime meridian, the longitude increases to 180 degrees. As you go west from the prime meridian longitude increases to 180 degrees. The 180 degree meridian is also known as the International Date Line. In the eastern hemisphere the longitude is given in degrees east and in the western hemisphere it is given in degrees west.
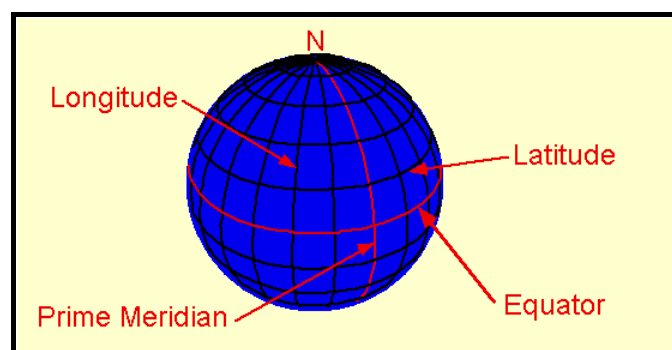
Figures 1:- Location of Longitude and Latitude

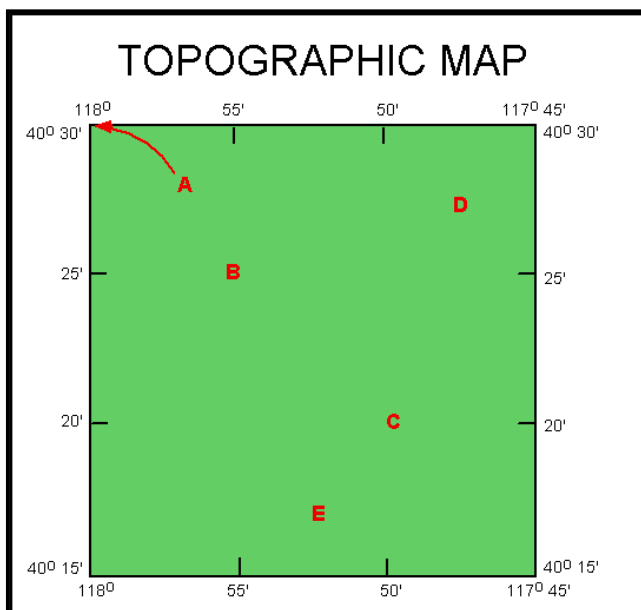## II. EXACT POSITION OF LATITUDE AND LONGITUDE

At the equator, one degree of latitude or longitude represents approximately 70 miles. At higher latitudes the distance of one degree of longitude decreases. Latitude stays the same because they are always equally spaced apart. On the other hand, if you look on a globe you will notice that the lines of longitude get closer together as they approach the north and south poles.

The basic unit of latitude and longitude is the degree (°), but degrees are a large unit so we often have to deal with subdivisions of a degree. Sometimes we just use a decimal point, such as 35.789°N . This format is referred to as decimal degrees. Decimal degrees are often found as an option on Global Position Systems (GPS) or with online topographic maps, but decimal degrees are not used on printed maps. On these topographic maps the latitude and longitude units are expressed in degrees, minutes, and seconds. Each degree is subdivided into 60 minutes ('). Each minute is divided into 60 seconds ("). Note the similarity to units of time which makes these relationships easy to remember. If we are interested in a general location we may just use degrees (one degree is equal to approximately 70 miles). For more precision we specify minutes (about 1.2 miles), or even seconds (0.02 miles). Note that we always need to specify the larger unit. You can't specify your latitude or longitude with just minutes or seconds. A coordinate such as 25' is meaningless unless the degrees are also given, such as 45° 25'.

III. TOPOGRAPHIC MAPS

The Lets look at how we can determine location in terms of latitude and longitude from a topographic map. The diagram below is a very simplified version of a topographic map. While no features are shown on the map, the marking for latitude and longitude found in the margins of topographic maps are shown. First let's determine what the numbers on the map mean. The numbers on the left and right side of the map are latitude. (As always we are assuming that north is to the top of the screen). The numbers across the top and bottom of the map are longitude. Let's determine what type of quadrangle this map represents. Longitude on the left of the map is 118°, longitude on the right side of the map is 117° 45'. The difference between these two is 15'. Latitude of the top of the map is 40° 30' and the latitude of the bottom of the map is 40° 15'. The difference between these two is also 15'. This map, which covers an area that is 15' x 15', would be referred to as a 15 minute map.

Notice that latitude and longitude is only fully written in the corners of the map. Along the edges of the map only the minutes are written. The map reader must realize that 20' latitude on this map is actually 40° 20', because 20' lies in between 40° 15' and 40° 30'. We can also use latitude and longitude to give the location of points on a map. Estimate the location of each of the red letters on the map in terms of latitude and longitude. Explanation

Figures 2:- Topographic Maps represents latitude and longitude

Table:-1 Representation of above graph of latitude and longitude

Point	Latitude	Longitude	Explanation
A	40° 30' N	118° W	Point A is in the upper left corner of map so its coordinates are the printed coordinates of this corner. The one thing that needs to be added are the direction notations of each coordinate. They are not printed on the map because it is assumed you can tell what hemisphere you are in.
B	40° 25' N	117° 55' W	To determine the location of point B we need to read across to the side of the map (to determine latitude) and up to the top of the map to determine longitude. Point B lines up with labeled tick marks labeled 25' and 55', but we know these numbers are incomplete. looking at the corner of the map we see that the latitude is 40° 25' N (north because of same argument for point A) and the longitude is 117° 55' W.
C	40° 25' N	117° 55' W	Follow the same procedure as point B above.
D	40° 27' 30" N	117° 47' 30" W	Point D does not line up directly with tick marks. Instead we need to estimate its location. Point D looks like it is half way

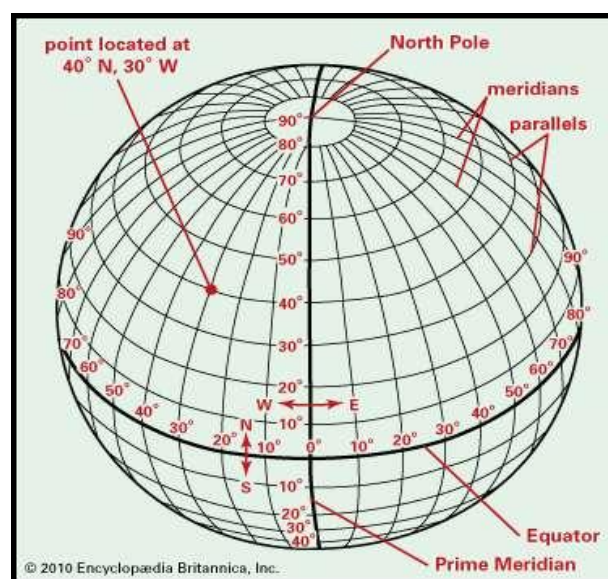|			
			between the 25' and 30' marks for latitude and half way between the 45' and 50' marks for longitude. Half way for each of these is 27'30" and 47'30". Remember one half a minute is 30 seconds. Adding the remaining parts of the coordinates as we did above give us the answer.
E	40° 16' N	117° 52' 30" W	Solved the same as point D above. The only difference is in estimating the minutes for latitude. Point E seems to closer to 15' that to 30' so I have estimated it as 16'. This is only an estimate so the answer can vary, but it should be greater than 15' and less than 17' 30"

IV. STATES IN INDIA WITH LATITUDE AND LONGITUDE

Latitude and longitude coordinate system by means of which the position or location of any place on earth's surface can be determined and described.

Table:-2 Latitude and Longitude of different states

States	Latitude	Longitude
Andaman And Nicobar	11.66702557	92.73598262
Andhra Pradesh	14.7504291	78.57002559
Arunachal Pradesh	27.10039878	93.61660071
Assam	26.7499809	94.21666744
Bihar	25.78541445	87.4799727
Chandigarh	30.71999697	76.78000565
Chhattisgarh	22.09042035	82.15998734
Dadra and Nagar	20.26657819	73.0166178

Haveli		
Delhi	28.6699929	77.23000403
Goa	15.491997	73.81800065
Haryana	28.45000633	77.01999101
Himachal Pradesh	31.10002545	77.16659704
Jammu and Kashmir	34.29995933	74.46665849
Jharkhand	23.80039349	86.41998572
Karnataka	12.57038129	76.91999711
Kerala	8.900372741	76.56999263
Lakshadweep	10.56257331	72.63686717
Madhya Pradesh	21.30039105	76.13001949
Maharashtra	19.25023195	73.16017493
Mainpur	24.79997072	93.95001705
Meghalaya	25.57049217	91.8800142
Mizoram	23.71039899	92.72001461
Nagaland	25.6669979	94.11657019
Orissa	19.82042971	85.90001746
Puducherry	11.93499371	79.83000037
Punjab	31.51997398	75.98000281
Rajasthan	26.44999921	74.63998124
Sikkim	27.3333303	88.6166475
Tamil Nadu	12.92038576	79.15004187
Tripura	23.83540428	91.27999914
Uttar Pradesh	27.59998069	78.05000565
Uttaranchal	30.32040895	78.05000565
West Bengal	22.58039044	88.32994665

Figures 3:- Point location latitude and longitude of earth

V. CONCLUSION

The Earth is divided into degrees of longitude and latitude which helps us measure location and time using a single standard. When used together, longitude and latitude define a specific location through geographical coordinates. These coordinates are what the Global Position System or GPS uses to provide an accurate locational relay. Longitude and latitude lines measure the distance from the Earth's Equator or central axis - running east to west - and the Prime Meridian in

Greenwich, England - running north to south. The lines of latitude run east and west, parallel to the Equator. They are used to define the North-South position of a location on the planet. The lines of longitude run north and south. They are used to define the East-West position of a location on the planet. They run perpendicular to the Equator and latitude lines. Because the Earth is essentially a spherical shape, it is considered to have 360 degrees. Therefore, the planet has been divided into 360 longitudes as a form of measurement.

VI. ACKNOWLEDGMENT

VII. REFERENCES

[1] Davies, M. E., T. R. Colvin, P. G. Rogers, P. G. Chodas, W. L. Sjogren, W. L. Akim, E. L. Stepanyantz, Z. P. Vlasova, and A. I. Zakharov, "The Rotation Period, Direction of the North Pole, and Geodetic Control Network of Venus," Journal of Geophysical Research , Vol. 97, £8, pp. 13,14 1-13,151, 2011.

[2] Bolstad, Paul. GIS Fundamentals (PDF) (5th ed.). Atlas books. p. 102. ISBN 978-0-9717647-3-6.

[3] Vespucci, Amerigo. "Letter from Seville to Lorenzo di Pier Francesco de' Medici, 1500." Pohl, Frederick J. Amerigo Vespucci: Pilot Major. New York: Columbia University Press, 1945. 76–90. Page 80.

[4] Archinal, Brent A.; A'Hearn, Michael F.; Bowell, Edward L.; Conrad, Albert R.; et al. (2010). "Report of the IAU Working Group on Cartographic Coordinates and Rotational Elements: 2009". Celestial Mechanics and Dynamical Astronomy. 109 (2): 101–135. ISSN 0923-2958.

[5] Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Jon Kimerling, A. and Guptill, S. C., Elements of Cartography,. John Wiley, 2002, 6th edn.

[6] Broda, H. W., & Baxter, R. E. Using GIS ans GPS Technology as an Instructional Tool. Social Studies, 94(4), 2003, 158-160.

[7] Gao, C. Y., Gao, L. & Zang, D. E. Application in the measurement of the expressway of GPS ,2006, 199-201.

Author: - Prof. Trupti Deoram Tembhekar
[Prof. Trupti Jayant Sakhare],
Assistant Professor (UA)
Department of Electrical Engineering
Yeshwantrao Chavan College of Engineering,
Nagpur, Maharashtra State, India.