NCERT SOLUTIONS

CLASS - 11th



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Class : 11th

Subject : Geography

Chapter : 4

Chapter Name : Map Projections

Q1 Choose the right answer from the four alternatives given below:

(i) A map projection least suitable for the world map :
(a) Mercator
(b) Simple Cylindrical
(c) Conical
(d) All the above

(ii) A map projection that is neither the equal area nor the correct shape and even the directions are also incorrect
(a) Simple Conical
(b) Polar zenithal
(c) Mercator
(d) Cylindrical

(iii) A map projection having correct direction and correct shape but area greatly exaggerated polewards is
(a) Cylindrical Equal Area
(b) Mercator
(c) Conical
(d) All the above

(iv) When the source of light is placed at the centre of the globe, the resultant projection is called
(a) Orthographic
(b) Stereographic
(c) Gnomonic
(d) All the above

Answer.
(i) -(c) Conical

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(ii) -(a) Simple Conical

(iii) -(b) Mercator

(iv) -(c) Gnomonic

Page : 47 , Block Name : Exercises

Q2 Answer the following questions in about 30 words:

(i) Describe the elements of map projection.
(ii) What do you mean by global property?
(iii) Not a single map projection represents the globe truly. Why?
(iv) How is the area kept equal in cylindrical equal area projection?

Answer.

(i) The elements of map projection are Reduced Earth, Parallels of Latitude, Meridians of Longitude and Global Property.

(ii) While preparing a map projection, there are certain properties that need to be preserved using certain methods. These properties are called global properties and have been listed below:

1. Distance between any given points of a region
2. Shape of the region
3. Size or area of the region in accuracy
4. Direction of any one point of the region bearing to another point.

(iii) For a map projection to be truly accurate, it needs to preserve all four of the global properties. But none of the projections can preserve all of them simultaneously, hence not a single map projection represents the globe truly.

(iv) In a cylindrical equal area projection, the surface area of the globe is projected on a cylinder with parallel rays meeting at the equator. Since the longitudes and latitudes intersect each other at right angles, the area is equal.

Page : 47 , Block Name : Exercises

Q3 Differentiate between—
(i) Developable and non-developable surfaces
(ii) Homolographic and orthographic projections
(iii) Normal and oblique projections
(iv) Parallels of latitude and meridians of longitude

Answer.

(i)

	Developable Surface	Non-Developable Surface
1.	It is a surface which can be flattened and a network of longitudes and latitudes can be projected.	It is a surface which cannot be flattened without breaking, shrinking or creasing.
2.	Developable surfaces include planes, cones and cylinders.	Non Developable surfaces include globes and spheres.

(ii) Homolographic projections are those projections in which the latitudes and longitudes are projected in such a way that area of every graticule on the map is equal to the area of corresponding graticule on the globe. Hence, it is also called equal area projection.

Orthographic projections, on the other hand are the projections in which the correct shape of a particular area of the Earth's surface is preserved.

(iii) When the developable surface touches the globe at the equator, it is called a normal projection. However, when the projection is tangential to any point between the poles and the equator, it is called an orthogonal projection.

(iv)

	Parallels of Latitude	Meridians of Longitude
1.	It is the angular distance of a place, north or south of the equator measured in degrees, minutes and seconds.	It is the angular distance of a place, east or west of the Prime Meridian measured in degrees, minutes and seconds.
2.	It uses 0° Latitude as the reference, known as the equator.	It uses 0° Longitude as the reference, known as the Prime Meridian.

3.	There are 181 parallels of latitude.	There are 360 meridians of longitude.
4.	It is useful to determine the temperature of a place.	It is useful to determine the time zone of a place.

Page : 47 , Block Name : Exercises

Q4 Answer the following questions in not more than 125 words :

(i) Discuss the criteria used for classifying map projection and state the major characteristics of each type of projection.
(ii) Which map projection is very useful for navigational purposes? Explain the properties and limitations of this projection.
(iii) Discuss the main properties of conical projection with one standard parallel and describe its major limitations.

Answer.

(i) The criteria used for classifying the map projection are as follows:

- On the basis of drawing techniques, the projections can be either perspective, non perspective and conventional.
- On the basis of developable surface, the projections can be either on a developable surface or on a non developable surface.
- On the basis of global properties, the projections can be classified as equal area, orthomorphic, azimuthal and equidistant projections.
- On the basis of source of light, the projections can be either gnomonic, stereographic or orthographic.

(ii) The Mercator projection is very useful for navigational purposes. It is a mathematical projection developed by a Dutch Cartographer named Mercator Gerardus Karmer in 1569.

Properties:
1. All parallels and meridians are straight lines and they intersect each other at right angles.
2. All parallels have the same length which is equal to the length of equator.
3. All meridians have the same length and equal spacing. But they are longer than the corresponding meridian on the globe.
4. Spacing between parallels increases towards the pole.

5. Scale along the equator is correct as it is equal to the length of the equator on the globe; but other parallels are longer than the corresponding parallel on the globe; hence the scale is not correct along them. For example, the 30º parallel is 1.154 times longer than the corresponding parallel on the globe.
6. Shape of the area is maintained, but at the higher latitudes distortion takes place.
7. The shape of small countries near the equator is truly preserved while it increases towards poles.
8. It is an azimuthal projection.
9. This is an orthomorphic projection as scale along the meridian is equal to the scale along the parallel.

Limitations:
1. There is greater exaggeration of scale along the parallels and meridians in high latitudes. As a result, size of the countries near the pole is highly exaggerated. For example, the size of Greenland equals to the size of USA, whereas it is 1/10th of USA.
2. Poles in this projection cannot be shown as 90º parallel and meridian touching them are infinite.

(iii) A conical projection is one which is drawn by projecting the image of a graticule of a globe on a developable cone which touches the globe along a parallel. This parallel is taken as a standard and the other parallels are distorted in length.

Properties:
1. All the parallels are arcs of concentric circle and are equally spaced.
2. All meridians are straight lines merging at the pole. The meridians intersect the parallels at right angles.
3. The scale along all meridians is true, i.e. distances along the meridians are accurate.
4. An arc of a circle represents the pole.
5. The scale is true along the standard parallel but exaggerated away from the standard parallel.
6. Meridians become closer to each other towards the pole.
7. This projection is neither equal area nor orthomorphic.

Limitations:
1. It is not suitable for a world map due to extreme distortions in the hemisphere opposite the one in which the standard parallel is selected.
2. Even within the hemisphere, it is not suitable for representing larger areas as the distortion along the pole and near the equator is larger.

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Page : 48 , Block Name : Exercises

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