BONNE'S PROJECTION

a. Definition of *Bonne projection:*

The Bonne projection is a pseudoconical equal-area map projection. A modified conical equal-area map projection having one standard parallel and all meridians curved except the central meridian which is a straight line.

b. **Origin:**

Used considerably by Rigobert Bonne (1727-1795) in the mid-18th century, but developed by others during the early 16th century.

c. Principles:

In this projection, a simple right circular cone is supposed to touch the generating globe along the standard parallel. The redial scale is truly preserved along the central meridian and the tangential scale is preserved along all the parallels. Consequently, the parallels are represented as concentric arcs of circles but the meridians appear as smooth curves. This is the modification designed by R. Bonne (a French Cartographer) to the original simple conical projection with one standard parallel.

i. **Scale:** Scale is true along the central meridian and along all parallels.

ii. **Distortion:** No distortion along the central meridian and along the standard parallel.

iii. **Usage:** Used for atlas maps of continents and for topographic mapping of some countries.

iv. **Limitations :** Use only for a single hemisphere.

d. Properties:

i. Parallels are concentric arcs of circles, truly spaced on the central meridian.
ii. Radial scale is true only along the central meridian.
iii. The tangential is true along all the meridians.
iv. Excepting the central meridian, all meridians are regular curves concave towards the centre.
v. At any point the product of the two principal scales is unity.
vi. It is an equal area projection.
vii. Since both parallels and meridians are curves, their intersection appears to be acute near the poles and obtuse near the lower latitudes.
viii. For small and compact countries with nearly equal latitudinal and longitudinal extensions, angular deformation is relatively less i.e. distortion in shape is less.
ix. It is used for the countries like, France, Netherland, Switzerland, Belgium, India etc.

e. Construction:

i. A straight line is drawn vertically through the centre of the paper to represent the central meridian.

ii. It is then divided by d for spacing the parallels.

iii. An arc of circle is then drawn through the standard parallel mark with radius rϕ and centre on the central meridian.

iv. Concentric arcs of circles are then drawn through each division on the central meridian to represent the remaining parallels.

v. Parallels are then divided with their corresponding division length (dϕ) on both sides of the central meridian.

vi. Smooth free-hand curves are then drawn through the corresponding division points on the parallels to represent the meridian.

vii. Lastly, the graticules are properly labelled.

f. Theory:

i. Radius of the generating globe reduce to the given Scale.

$$\mathrm{R} = \frac{Radius\ of\ the\ actual\ Earth}{Nominal\ Scale}$$

ii. The division on the central meridian for spacing the parallels at i° interval

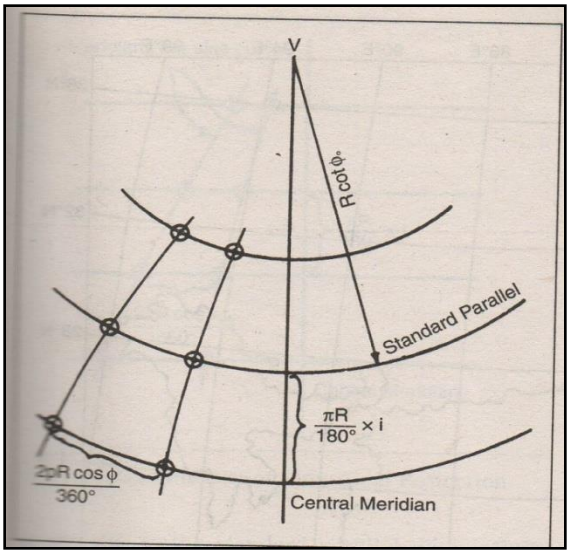
$$d = \frac{\pi\,\mathrm{R}}{180} \times i°$$

iii. Radius of the Standard Parallel ($\emptyset_0$)

$$r\emptyset = Rcot\emptyset_0$$

iv. The division on the parallels for spacing the meridians at i° interval.

$$\mathrm{d}\phi = \frac{2\pi\mathrm{R}\cos\emptyset}{360°} \times\ i°$$



Example:

i. **Draw a Graticules of Bonne's projection for the map of India extending from 8°North to 40° North and 66°East to 98° East at an interval of 4° on the scale of 1: 25000000**.

Ans :

i. **Step-1:** Radius of the generating globe reduce to the given Scale.

$$R = \frac{Radius\ of\ the\ actual\ Earth}{Nominal\ Scale}$$

$$= \frac{640000000}{25000000}$$

= 25.6cm.

ii. **Step-2:** Selected Parallels are- 8°N 12°N 16°N 20°N **24°N** 28°N 32°N 36°N, 40°N

iii. **Step- 3:** Selected Central Meridians is:

$$= \frac{66°E + 98°E}{2}$$

= 82°E

iv. **Step-4:** The division on the central meridian for spacing the parallels at i° interval

$$d = \frac{\pi\ R}{180} \times i°$$

$$= \frac{\pi\ \times 25.6}{180} \times 4°$$

= 1.78 cm.

v. **Step**-5: Radius of the Standard Parallel

$$r\emptyset = R cot\emptyset$$
$$= 25.6\text{cm.} \times cot\emptyset$$
$$= 25.6 \times \cot 24°$$
$$= 57.49\text{cm.}$$

vi. **Step**-6: Divisional length along the parallels for spacing the meridians ($d\phi$) at i° interval.

$$d\phi = \frac{2\pi R \cos\emptyset}{360°} \times i°$$

ϕ	8°N	12°N	16°N	20°N	**24°N**	28°N	32°N	36°N	40°N
$\frac{2\pi R \cos\emptyset}{360°} \times i°$	1.7689	1.7481	1.7171	1.6785	1.6318	1.5772	1.5148	1.4451	1.3690
Result in cm.(working unit)	1.77	1.74	1.71	1.67	1.63	1.57	1.51	1.44	1.36

BONNE'S PROJECTION

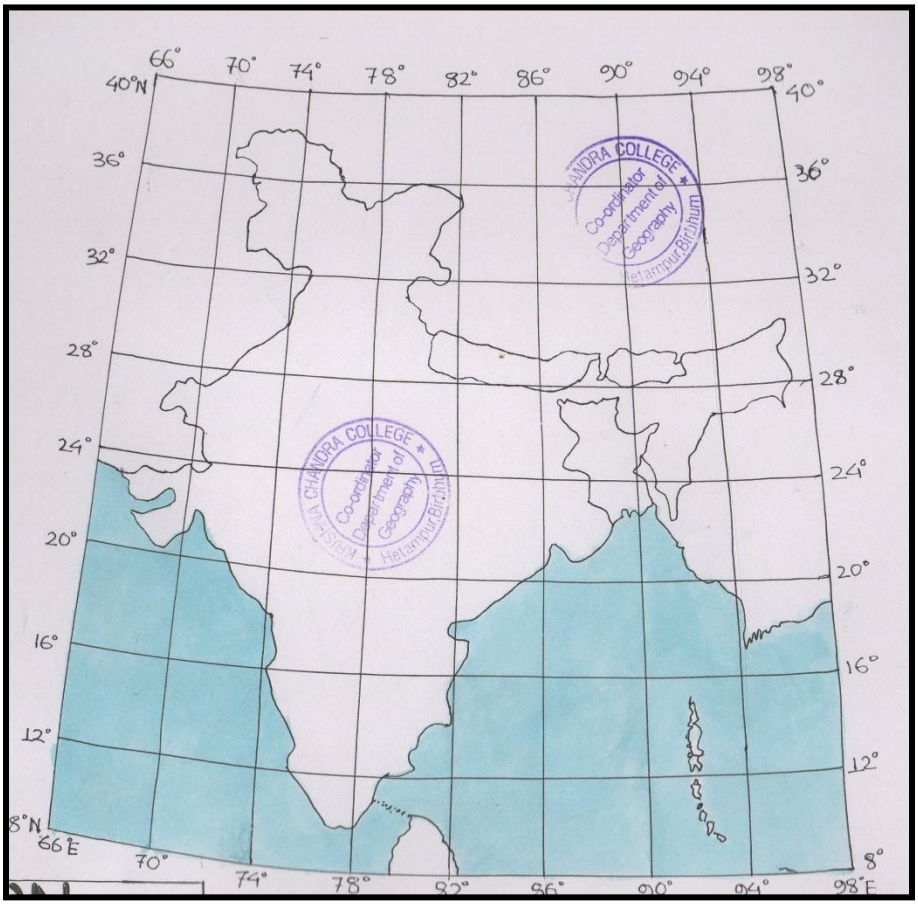
Showing the Map of India

EXTENSION

Latitude-8° N-40°N

Longitude-66°E-98°E

Interval: 04°



R.F. 1:25000000

SCALE

1cm. to 250km.

500 250 0 250 500 750 1000 1250km.

km. km.